Understanding ARITHMETIC

5

McSWAIN · ULRICH · COOKE

Understanding Arithmetic 5

—Its Meaning and Use—

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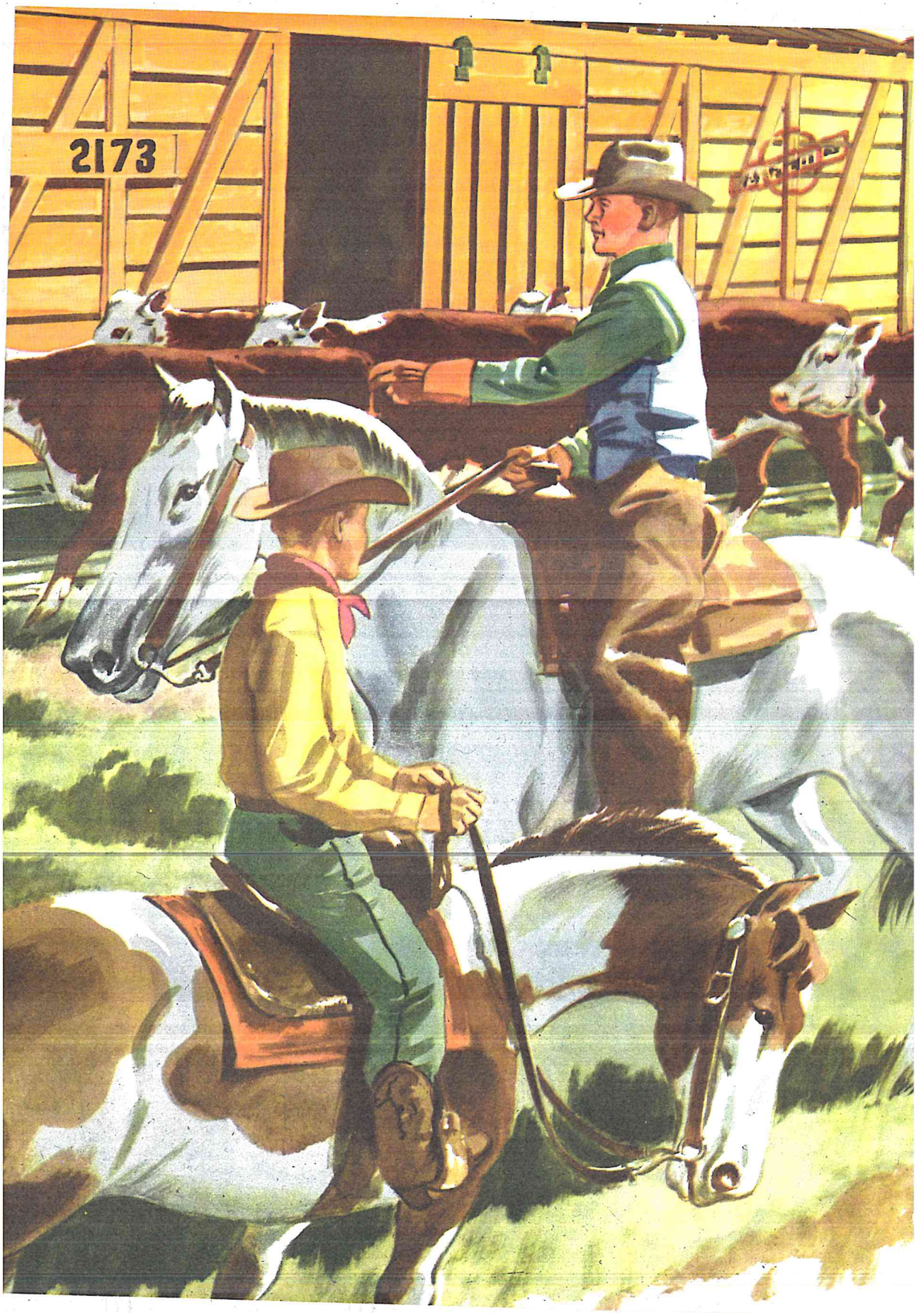
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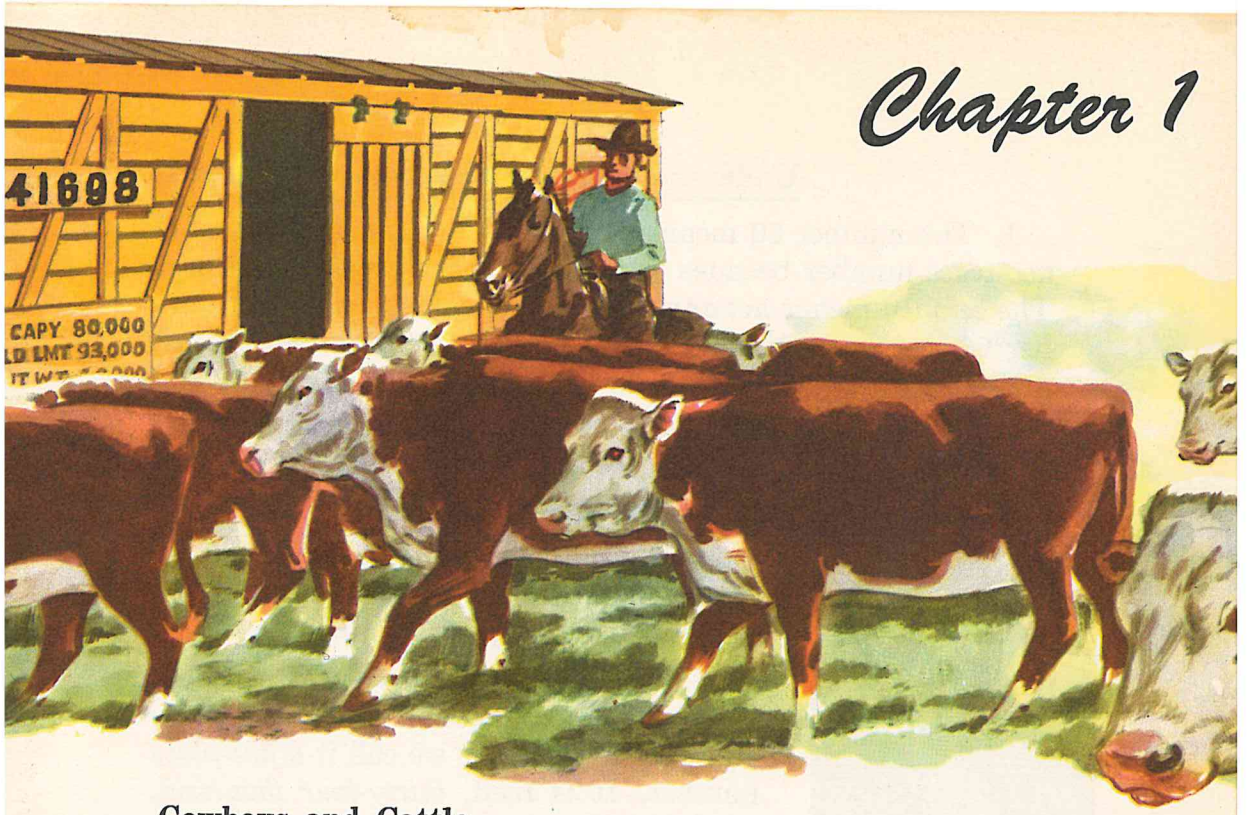
Chapter 1



Cowboys and Cattle

The cowboys in the picture are loading cattle to be sent to market. Answer these questions about the picture.

1. On your paper write the number that tells how many people you see in the picture. Is this number called a one-place, a two-place, or a three-place number? Why?

2. Each cattle car will hold about 23 cattle. Write that number. Can you tell what each figure in it means?

3. The cowboys plan to ship 350 head of cattle. Write that number. Can you tell what each figure in it means?

4. The cattle will weigh about 1150 pounds each. Write that number. How many places are there in it?

5. On one of the cattle cars in the picture is the number 41698. Write that number. How many places are there in it? Can you tell what each figure in the number means?

6. Tell the meaning of other numbers you see in the picture, or that you would use in telling about it.

Understanding the Meaning of Numbers

1. The number 60 means 6 *tens* and no *ones*. It is called a *two-place* number because there are places for tens and ones. The *zero* (0) means *not any*, or none. When we write the number 60, we write 0 in ones' place to show that there are no ones in that number.

2. The number 508 means 5 *hundreds*, no *tens*, and 8 *ones*. Why is it called a *three-place* number?

This chart will help you understand larger numbers.

Decimal Units				
Ten-Thousands	Thousands	Hundreds	Tens	Ones
	6	9	0	2
3	4	5	7	9

3. The number 6902 means 6 *thousands*, 9 *hundreds*, no *tens*, and 2 *ones*. Why is it called a *four-place* number?

4. The number 34,579 means 3 *ten-thousands*, 4 *thousands*, 5 *hundreds*, 7 *tens*, and 9 *ones*. Tell why we call it a *five-place* number. It is read, *thirty-four thousand, five hundred seventy-nine.*

5. The number system we use is called the *Decimal System*. The word *decimal* comes from the Latin word meaning *ten*. *Ones*, *tens*, *hundreds*, *thousands*, and *ten-thousands* are *decimal units* because:

10 ones = 1 ten			3 ones = 3 × 1 = 3
10 tens = 1 hundred	so	3333	3 tens = 3 × 10 = 30
10 hundreds = 1 thousand	means:		3 hundreds = 3 × 100 = 300
10 thousands = 1 ten-thousand			3 thousands = 3 × 1000 = 3000

6. What does each 6 in 6666 mean? Each 7 in 7777?

7. Study the chart at the right. It shows what 5408 means.

5 ×	1000 =	5000
4 ×	100 =	400
0	=	00
8 ×	1 =	8
		5408

8. Make decimal-unit charts like the one at the right to show what each of these numbers means: 79; 150; 847; 8013; 8490; 27,485.

Reading and Writing Larger Numbers

When we write a larger number we usually use commas to separate the figures into groups or *periods*, so that the number will be easy to read.

Each period has three places, and is named for the smallest unit in that period.

The figures in each period are read together. Notice the number 327,469,586. It is read, *three hundred twenty-seven million, four hundred sixty-nine thousand, five hundred eighty-six*. The ones' period name is not read.

Periods											
Millions				Thousands				Ones			
Hundred-Millions	Ten-Millions	Millions	,	Hundred-Thousands	Ten-Thousands	Thousands	,	Hundreds	Tens	Ones	
3	2	7	,	4	6	9	,	5	8	6	

1. Study the chart above. Then tell which of the following numbers have two periods. Which numbers have three periods?

412 12,323 35,196 317,275 5,517,918 35,989,600

2. Read each of the above numbers.

3. Which number above is the smallest? The largest?

4. Read the 1950 census figures for each of these states:

Nevada	160,083	North Dakota . . .	619,636
South Dakota . .	652,740	Montana	591,024
New Jersey . . .	4,835,329	New York . . .	14,830,192

5. Make a list of these states according to population, putting the state with the smallest population first.

6. Read the following sentences:

The population of the United States in 1950 was 150,697,361.

In a recent year the airlines carried 31,981,000 passengers.

Now you have learned:

- Large numbers are usually written in *periods* of three figures each so that they will be easier to read.

Practicing the Addition Facts

We *add* to find *how many* or *how much in all.* In an addition example the numbers are called *addends* because they are to be added. The addition sign (+) is called the *plus sign*. The answer is called the *sum*. The sum is equal to all of the addends. We say: 4 *and* 5 *are* 9, or 4 *plus* 5 *equals* 9.

4 addend
+5 addend
9 sum

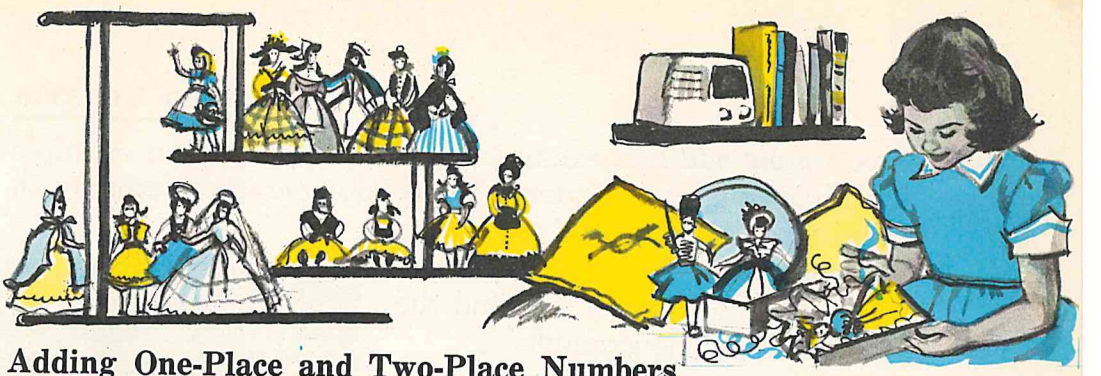
These 81 addition examples with their sums are called the *addition facts*. Think the sum for each example. Then write each example and its sum. Make sure that you know all of the addition facts.

1.	3	7	4	6	3	2	5	3	1	1	8	9
	6	1	2	2	3	7	4	4	5	8	5	2
2.	4	5	1	6	1	2	7	2	2	4	1	2
	4	1	6	3	4	5	2	3	4	5	1	8
3.	3	4	1	2	2	3	1	1	3	8	9	6
	2	3	7	1	2	7	3	2	5	7	5	1
4.	3	2	5	4	9	7	5	5	7	4	7	8
	1	6	2	1	8	7	7	6	3	9	4	9
5.	4	6	4	8	9	5	6	3	9	5	8	5
	8	6	7	2	7	9	8	8	1	5	8	3
6.	6	6	7	8	9	8	8	9	2	6	1	7
	4	5	5	6	9	1	3	4	9	9	9	6

7.	7	7	6	8	9	5	9	4	3
	9	8	7	4	6	8	3	6	9

If you forgot the answer for any addition fact, you can find it by counting. Begin with the large addend and count as many numbers as there are ones in the small addend. For 8 + 5 = ?, you would begin with 8 and count: 9, 10, 11, 12, 13. So 8 + 5 = 13.

Practice the facts you forgot until you know them well.



Adding One-Place and Two-Place Numbers

1. Betty had 14 storybook dolls. She got 3 dolls on her birthday. How many dolls did she have in all?

To add 14 to 3, add the ones and bring down the tens. Study the example at the right. The T stands for *tens* and the O for *ones*.

T	O
1	4
+	3
1	7

To add 14 and 3 quickly, think: $4 + 3 = 7$, so $14 + 3 = 17$. Find the sums for these examples:

2.

14	27	40	95	84	60	10	62	56	74
3	2	9	4	4	7	8	5	3	2

To find the sums for the examples in row 3, you add the ones, change 10 ones to 1 ten, and add it to the tens, as shown in the example at the right.

T	O
5	8
+	6
6	4

To add $58 + 6$ the quick way, think: $8 + 6 = 14$, so $58 + 6 = 64$. Find the sums for the examples in row 3. Use the quick way.

3.

35	83	17	24	78	45	35	69	58	28
6	9	6	9	8	7	8	8	2	5

To find the sums in row 4, add the ones, change 10 ones to 1 ten, add it to the tens, and change 10 tens to 1 hundred. Study the example at the right. The H stands for *hundreds*.

H	T	O
	9	8
+		4
1	0	2

Is there a quick way to find the sums for examples like those in row 4? Find these sums:

4.

98	94	99	98	99	96	99	92	99	97
4	6	9	7	5	9	1	9	7	7

Column Addition

A *simple addition* example has two addends. An example with more than two addends is a *column addition* example. In column addition you *add* to find an unseen sum, *remember* it, *add* again, and so on until you find the total sum for the example.

1. Study this example. ⟶

In it you must find two *unseen sums* before you find the *total sum*.

2		
2	+3	
3	5	unseen sum
4	+4	
+2	9	unseen sum
	+2	
	11	total sum

2. Find the answers for these column addition examples:

5	3	1	2	3	1	4	5	3	4	6	3
1	1	3	1	3	5	2	2	1	2	1	2
2	1	4	3	2	1	1	2	2	3	1	3
1	2	1	2	1	2	6	4	6	4	7	4

In some examples the unseen sums are two-place numbers.

3. What is the first unseen sum in the example at the right? What is the second unseen sum?

4
7
8
+6
25

4. Find the answers for these column addition examples. First add down. Then *add up to check.*

3	9	6	9	8	7	9	9	8	9	6	9
9	8	6	9	9	9	5	4	9	6	9	9
8	4	9	8	9	9	9	9	8	8	9	8
2	7	4	5	8	7	8	8	9	7	9	6

5. Each example below has one two-place addend. Add the ones, change each 10 ones to 1 ten and add it to the tens. Change 10 tens to 1 hundred if you need to. Add and check:

5	20	7	43	4	79	89	3	90	98
7	9	4	8	6	6	6	4	8	9
13	7	5	1	55	7	9	5	3	8
6	8	35	9	5	8	7	96	9	7

Adding Two-Place Numbers

1. During the month of September the girls in the fifth-grade class read 52 books. The boys read 46 books. How many books altogether did the children read?

In the example for the problem, both addends are two-place numbers. To find the sum, add the ones and then add the tens. You add tens in the same way that you add ones.

T	O
5	2
+4	6
9	8

The sum is 9 tens and 8 ones, or 98.

Study the example at the left of each row of examples below. Then find the sums for the examples in that row. Add down. Check your answer by adding up.

24	45	20	61	30	42	60	53
+35	43	50	26	25	56	30	14
59							

2. 72

In row 3, you change each 10 tens to 1 hundred.

63	60	11	25	42	91	83	57
42	99	52	30	31	72	92	81
+21	40	76	61	54	85	62	20
126							

3. 74

In row 4, you must change each 10 ones to 1 ten.

21	19	29	16	27	36	15	35
19	18	14	39	33	20	30	18
32	27	29	24	12	15	18	23
+23	19	25	17	18	27	34	17
95							

4. 16

To find the sums in row 5, you must change each 10 ones to 1 ten and each 10 tens to 1 hundred.

62	86	63	40	21	32	54	98
75	32	70	95	78	45	62	75
38	47	98	82	56	67	79	14
+59	29	34	57	45	53	86	31
234							

5. 99

You will remember:

- You add *tens* in the same way that you add *ones*.

Problem Solving

1. John's team made 2 runs in the first inning, 3 runs in the second, 2 runs in the third, and 3 runs in the fourth. How many runs did the team make in all four innings?

Answer these questions about this problem:

- What does the problem tell?
- What does it ask you to find?
- What must you do to solve it?

Now find the answer.

$$\begin{array}{r} 2 \\ 3 \\ 2 \\ +3 \\ \hline 10 \end{array}$$

Use the same plan to solve these problems:

2. The opposing team made 5 runs in the first inning, no runs in the second, 4 runs in the third, and 3 runs in the fourth. How many runs did that team make in four innings?

3. Martha and her mother drove to the city. They drove 38 miles the first hour, 44 miles the second, and 27 miles the third. How far had they driven in three hours?

4. Bob gathered 95 white eggs and 67 brown ones. How many eggs did he gather altogether?

Did you discover that each problem above:

- Told you *how many in each group?*
- Asked a question that meant, *find how many in all?*

You will remember:

- To find *how many in all* you *add.*

Three-Place Numbers in Addition

1. Study example A. One of the addends is a *three-place* number. To find the sum, add the ones and change 10 ones to 1 ten. Add the tens and change 10 tens to 1 hundred. What is the sum?

2. Study example B. Both addends are three-place numbers. You add hundreds in the same way that you add ones or tens. To find the sum, add the ones and change 10 ones to 1 ten. Add the tens and change 10 tens to 1 hundred. Add the hundreds and change 10 hundreds to 1 *thousand* (Th). What is the sum?

A

H	T	O
4	7	8
+ 6	9	
5	4	7

B

Th	H	T	O
	4	6	5
+	5	7	6
1	0	4	1

Find the sums below. Change ones to tens, tens to hundreds, and hundreds to thousands when you need to. Add down. Check by adding up. If you get the same answer each time, it is probably right.

3.	302	181	63	456	75	789	55	925
	90	92	972	18	239	45	999	75
4.	12	23	60	724	18	71	876	27
	43	41	75	15	37	94	65	82
	10	362	990	227	596	50	54	38
	504	42	40	18	14	417	94	953
5.	365	400	264	721	463	187	735	894
	214	298	924	846	246	760	583	975
6.	513	805	506	947	239	486	567	989
	378	175	874	645	376	398	498	697
7.	125	316	300	138	195	242	389	999
	229	198	229	511	409	163	464	909
	132	225	705	827	182	234	598	990
	208	146	318	219	176	358	675	900

You will remember:

- You add *hundreds* in the same way you add *tens* or *ones*.

A Visit to the Park

A group of children and their parents visited the park one Saturday. They bought lunch at the refreshment stand. Find the answer for each problem they had to solve.

1. Janet's mother bought a ham sandwich, a cheese sandwich, a bottle of pop, and a quart of ice cream to take home. How much did she spend?

When you add money numbers, you must use the dollar sign with the first addend and with the sum. You must use the cents point with each number. Be sure to keep the cents points in a vertical line.

$$\begin{array}{r} \$\ .25 \\ .20 \\ .07 \\ +.55 \\ \hline \$1.07 \end{array}$$

2. Roy bought a single-dip cone and a candy bar. How much did he spend?

3. Bill's father bought a bottle of pop for Bill, a candy bar for himself, and a half-gallon of ice cream to take home. How much money did he spend altogether?

4. Mary's mother bought a bottle of pop for Mary, a candy bar for Judy, a quart of ice cream for lunch, and a half-gallon of ice cream to take home. How much did she spend?

5. You know how much Janet's mother, Roy, Bill's father, and Mary's mother each spent for the things they bought. How much did they spend altogether?

To Help You Remember

The numbers after the questions are page numbers that tell you where to turn for help if you need it.

▶ *To think and talk about:*

1. What is the difference in value between the 6 in 60 and the 6 in 600? (6)

2. Read these numbers:

56 708 46,030 5,684 2,100,211 (6-7)

3. Tell what each figure means in the numbers above. (6-7)

4. Explain how you would check the answer for an addition example. (10)

5. Explain how to solve a problem. (12)

6. When do you add to solve a problem? (12)

▶ *To think about and write:*

1. Write these numbers using figures. Use commas to separate them into periods. (7)

Three hundred eighty-four thousand, one hundred seven.

Six million, five hundred seventy thousand, two hundred eleven.

Find the sums for these examples. Check your work.

2.
95
8 (9)

3.
75
97 (11)

4.
664
75 (13)

5.
736
478 (13)

6.
75
6
4
3 (10)

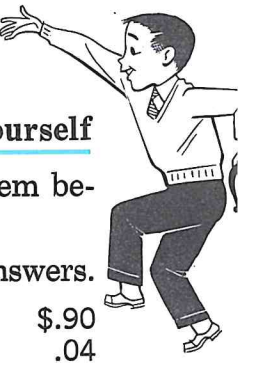
7.
28
13
24
32 (11)

8.
865
94
78
64 (13)

9.
365
480
721
142 (13)

10. What three questions should you think about in solving this problem? Solve the problem. (12)

Herbert had 24 marbles. Then he bought 12 on Saturday, and 18 on Monday. How many marbles did he have altogether?



Testing Yourself

Find the sum for each example and solve each problem below.

Work quickly, but take time to get the right answers.

1.	6	4	7	7	9	6	92	6	70	$.90
	3	3	2	4	5	4	7	63	5	.04
2.	63	9	98	25	81	56	96	72	54	$.89
	8	37	9	66	18	93	53	69	26	.42
3.	7	7	4	99	9	16	24	59	94	$.48
	3	3	3	7	29	20	12	20	56	.69
	2	8	90	6	39	21	35	80	67	.50
	4	6	2	5	9	12	20	40	75	.85
4.	236	103	812	912	140	451	498	$1.83		
	123	300	304	413	135	242	250	2.92		
	317	210	500	612	180	133	423	1.39		
	212	324	513	125	122	562	472	3.10		

5. Jim took a trip with his father. On the road he counted 8 Fords, 3 Nashes, 6 Buicks, and 12 Chevrolets. How many cars did he count in all?

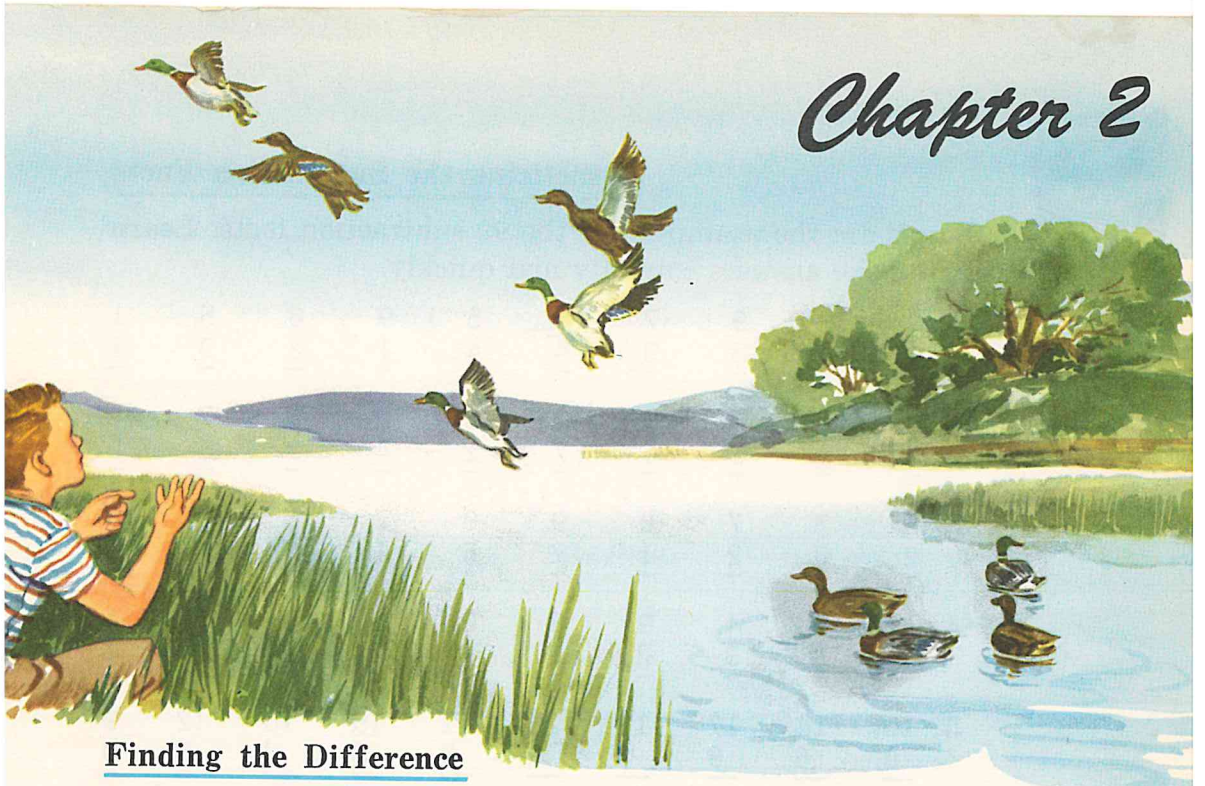
6. Jane sold 12 tickets for the school play, Sue sold 14, Ann sold 19, and Betty sold 15. How many tickets did the girls sell altogether?

7. On Monday John delivered 85 papers and Dick delivered 72. How many papers did both boys deliver?

8. Jack had $2.98. He earned $1.80 by running errands and $.25 by mowing the lawn. How much did he have then?

9. The Mead family took a three-week motor trip. Mr. Mead drove 968 miles the first week, 754 miles the second week, and 802 miles the third week. How far did he drive in the three weeks?

10. Donna's mother bought her a new dress for $7.64, a pair of shoes for $5.75, and a scarf for $1.25. How much did all three things cost?



Chapter 2

Finding the Difference

Bill counted 4 ducks on the pond and 5 flying away. He could tell *how many* ducks *in all* had been on the pond by adding 5 and 4. $5 + 4 = 9$.

If he had counted 9 ducks while they were all on the pond and had seen 5 of them fly away, he could have found *how many were left by subtracting* 5 from 9.

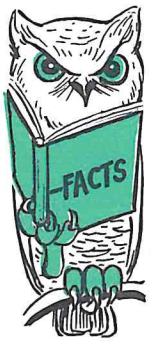
To find the *difference* between two numbers, we *subtract* the *subtrahend* from the *minuend*. The sign (−) is called the *minus sign*. The example at the right is read, *nine minus five equals four.*

9	minuend
−5	subtrahend
4	difference

1. Which number in the addition example below is like the minuend in each of the subtraction examples?

2. Which numbers in each subtraction example are like the addends in the addition example?

8	addend	15	minuend	15	
+7	addend	−8	subtrahend	−7	
15	sum	7	difference	8	



Practicing the Subtraction Facts

These are the examples for the 90 subtraction facts. Learn to write the answers correctly and quickly.

1.	8	7	9	7	6	5	9	6	5	1
	4	5	8	3	4	4	1	2	3	1
2.	8	9	8	4	8	3	9	6	7	5
	5	3	2	1	7	2	4	3	4	5
3.	5	7	7	6	9	9	7	6	9	8
	2	6	2	1	7	5	1	5	6	8
4.	4	8	4	9	8	8	2	3	5	4
	2	3	3	2	1	6	1	1	1	4
5.	10	14	17	12	16	11	15	10	12	9
	3	6	9	6	8	3	8	2	8	9
6.	10	13	11	12	10	11	10	10	14	7
	4	4	9	3	8	2	7	9	5	7
7.	13	15	13	12	12	13	14	10	18	3
	6	9	5	7	9	9	7	5	9	3
8.	11	16	10	15	15	11	14	11	12	2
	8	7	6	6	7	6	8	7	4	2
9.	13	14	11	16	17	10	11	12	13	6
	7	9	4	9	8	1	5	5	8	6

Did you discover that the last example in each row was different from the others in the row? Can you tell why?

If you forget the answer to any subtraction fact, you can find it by remembering the related addition fact. For $11 - 8 = ?$ remember that $8 + 3 = 11$, so $11 - 8 = 3$.

You can also find the answer by counting from the subtrahend to the minuend. For $12 - 9 = ?$ start with 9 and count: 10, 11, 12. How many numbers did you say? Then $12 - 9 = 3$.

Problem Questions Answered by Subtraction

You have learned that *to solve a problem* means *to find the answer to the question it asks.* Notice the questions in the problems on this page. Do you see that each of the questions can be answered by subtracting?

Solve each problem below.

1. Sandy bought 18 flower plants for her garden. June bought 9 plants. How many more plants did Sandy buy than June?

2. John bought 15¢ worth of stamps and Roy bought 9¢ worth of stamps. How much less did Roy spend than John?

3. Roy had 14 chickens and sold 6 of them to Jim. How many chickens did Roy have left?

4. Tom had 17¢ when he left for the store. He had only 8¢ when he came home. How much did he spend?

5. There are 13 girls in Judy's grade. On a cold day only 9 girls were present. How many girls were absent?

6. Janet can get a small candy bar for 3¢ and a large candy bar for 10¢. What is the difference between the prices of these candy bars?

Did you discover that each problem above:

> Told you the *number of things*, or the amount of money *in a large group?*

> Told you the *number of things*, or the amount of money *in a smaller group?*

> Asked you a question that meant that you should *find the difference* between the larger and the smaller numbers?

You will remember:

To *find the difference* between two numbers you *subtract.*

Two-Place Answers in Subtraction

1. There are 19 boys and 6 girls in the school band. How many more boys than girls are in the band?

To solve the problem find the difference between 19 and 6. Study example A. First subtract the ones, then bring down the tens. What is the difference? What kind of a number is it? What is the answer to the question the problem asks?

2. Study example B. Sometimes there is not any difference between the ones. Then write zero in ones' place and bring down the tens.

3. Study example C. In it there are more ones in the subtrahend than in the minuend. You must change 1 ten to 10 ones, add them to the ones already in the minuend, and remember how many tens are left. $12 - 7 = 5$. Write 5 ones. Then bring down the 4 tens that are left. What is the answer?

	T	O
A	1	9
	−	6
	1	3

	T	O
B	4	8
	−	8
	4	0

	T	O
C	5	2
	−	7
	4	5

Each example below is like one of those shown above. Find the answers for these subtraction examples:

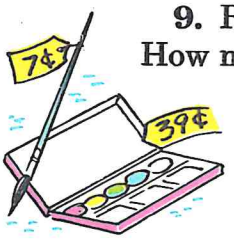
4. 28	47	89	34	98	79	52	67	28	19
4	5	7	3	6	8	2	4	7	9
5. 65	73	95	82	54	38	41	20	66	93
8	7	9	8	6	9	7	5	8	6
6. 41	82	54	35	91	72	46	83	67	50
3	5	9	7	6	9	7	5	8	6

Solve these problems:

7. Tom had 25¢ and spent 8¢ for a double-dip cone. How much money did he have left?

8. Henry weighs 90 pounds and his baby brother weighs 9 pounds. What is the difference in their weights?

9. Ruth bought a box of paints for 39¢ and a brush for 7¢. How much more did the paints cost than the brush?



Subtracting Two-Place Numbers

1. In the examples below both the minuend and subtrahend are two-place numbers. Study the subtraction in each example. Review the steps you must take to find its answer.

	T | O		T | O		T | O		T | O		T | O
	5 | 6		6 | 9		5 | 0		9 | 6		3 | 6
A	−3 | 5	B	−2 | 0	C	−3 | 0	D	−2 | 9	E	−2 | 9
	2 | 1		4 | 9		2 | 0		6 | 7		| 7

- In example A, subtract ones, then subtract tens.
- In example B there are no ones to subtract from 9, so bring down 9 ones. Then subtract the tens.
- In example C there are no ones in the minuend or the subtrahend, so write zero in ones' place. Then subtract tens.
- In example D there are more ones in the subtrahend than in the minuend so change 1 ten to 10 ones and add them to the ones. 16 − 9 = 7. 8 tens left − 2 tens = 6 tens.
- In example E there are no tens in the answer. Can you explain why there are no tens in the answer in this example?

2. *To check your answer in subtraction, add the subtrahend and the difference.* The sum should equal the minuend.

Subtract, and check your answers:

3.	38	49	75	80	63	54	93	87	72	82
	25	47	45	60	37	28	89	68	37	47
4.	74	87	96	69	98	63	81	74	40	92
	50	35	72	34	69	26	77	38	32	45
5.	58	70	61	45	83	26	72	54	97	63
	39	43	29	17	35	18	46	27	58	44

You will remember:

- You subtract *tens* in the same way you subtract *ones*.

Using Three-Place Numbers in Subtraction

1. Study the subtraction in each example below. To work examples like A, B, C, D, and E, you subtract ones, subtract tens and bring down hundreds. In examples like F, G, H, I, and J, you subtract ones, subtract tens, and subtract hundreds.

	H	T	O
A	7	3	5
	− 2	1	
	7	1	4

	H	T	O
B	3	7	8
	−	8	7
	2	9	1

	H	T	O
C	8	9	0
	−	4	5
	8	4	5

	H	T	O
D	1	3	6
	−	6	9
		6	7

	H	T	O
E	5	0	4
	−	7	8
	4	2	6

	H	T	O
F	6	4	5
	− 2	3	2
	4	1	3

	H	T	O
G	9	3	9
	− 3	5	3
	5	8	6

	H	T	O
H	4	9	0
	− 1	8	5
	3	0	5

	H	T	O
I	5	1	6
	− 4	6	7
		4	9

	H	T	O
J	3	0	0
	− 1	2	4
	1	7	6

- In examples B and G, you change 1 hundred to 10 tens.
- In examples C and H, you change 1 ten to 10 ones.
- In examples D and I, you change 1 ten to 10 ones and 1 hundred to 10 tens.
- In examples E and J you change 1 hundred to 10 tens and then change 1 ten to 10 ones before you subtract.

Subtract, and check your answers.

2.	546	398	780	457	548	125	480	555
	24	45	50	82	60	31	39	46
3.	974	142	760	273	107	500	902	407
	19	53	98	75	39	61	74	99
4.	580	798	236	906	820	656	472	963
	320	495	200	816	130	375	334	836
5.	241	540	756	320	444	200	808	502
	125	366	479	191	255	199	589	276

You will remember:

- You subtract *hundreds* as you do *tens* or *ones*.

Making Change

Jane bought a loaf of bread for 19¢. She handed the clerk a half-dollar. As the clerk gave Jane the bread he said, "Nineteen." Then he gave her 1 cent, saying, "Twenty," 1 nickel, saying, "Twenty-five," and 1 quarter, saying, "Fifty."

1. Where did the clerk begin his count? Where did he end the count?

2. Nancy bought a 7¢ ice cream cone and gave the clerk a quarter. What should the clerk say as he gives her the cone; 3 cents; a nickel; a dime?

3. Tom paid 39¢ for a model plane and gave the clerk $1. Would 1 cent, 1 dime, and 1 half-dollar be the right change?

4. Copy the chart below and fill in the missing figures.

Price	Coin Used	Coins Received: cent	nickel	dime	quarter	half	Amount of Change
9¢	25¢	___	___	___	___	___	16¢
28¢	50¢	___	___	___	___	___	___
53¢	$1	___	___	___	___	___	___
36¢	$1	___	___	___	___	___	___

5. Robert bought a softball for $1.47. How much change should he receive from $5.00? How could it be counted?

The clerk might say, as he gives Robert the change, "$1.47, $1.50, $2.00, $3.00, $4.00, $5.00." Robert would have 3 cents, 1 half-dollar, and 3 dollar bills, or $3.53.

You can get the same answer by subtracting as shown at the right. Notice that the dollar sign is used with the minuend and with the difference. The cents points are used with each number and are kept in a vertical line.

$$\begin{array}{r} \$5.00 \\ -1.47 \\ \hline \$3.53 \end{array}$$

Practice in Subtraction

Subtract, and check your answers.

1.	18	69	19	72	57	87	56	65	14	60
	8	5	7	6	3	9	7	7	4	1
2.	88	75	69	72	64	90	44	98	42	72
	83	42	58	38	59	80	16	59	35	49
3.	765	752	221	542	700	365	802	483		
	53	39	18	65	86	76	54	69		
4.	806	403	560	988	688	888	858	628		
	727	189	276	599	439	769	367	437		
5.	200	481	502	236	740	656	773	601		
	167	232	346	176	421	320	366	425		

Answer the questions these problems ask:

6. At the school picnic there were 630 children and 158 parents and teachers. How many more children than parents and teachers were at the picnic?

7. Bertha bought a pint of ice cream for 35¢. She handed the clerk a dollar. The clerk gave her a nickel, a dime, and a half-dollar. How much change did Bertha get?

8. Helen is reading a book that has 242 pages. She has read 178 pages. How many more pages has she to read?

9. Margaret had 50¢. After buying her lunch she had 15¢ left. How much did she spend for her lunch?

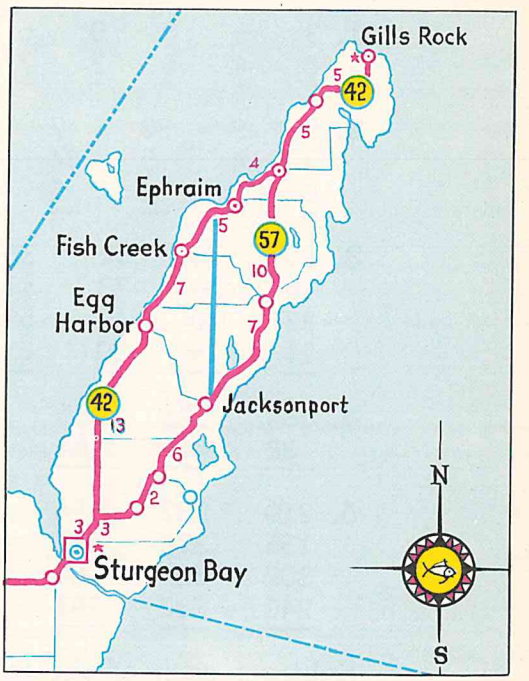
10. A farmer raised 134 bushels of potatoes and sold 97 bushels. How many bushels did he have left?

11. Fred gave the clerk in the hardware store a half-dollar for a flashlight battery that cost 12¢. What coins should Fred receive in change?

12. Mrs. Long bought a spool of thread for 9¢ and gave the clerk a quarter. How much change should he give Mrs. Long?

Using a Road Map

Below is a road map of a part of Door County, Wisconsin. Each small circle on the map marks a town. The small red figures near the numbered highways show distances between towns. Use the map and answer these questions:



1. How far is it from Egg Harbor to Fish Creek? From Fish Creek to Ephraim?

2. How far is it from Fish Creek to Gills Rock?

3. How far is it from Fish-Creek to Sturgeon Bay? From Sturgeon Bay to Gills Rock?

4. Sturgeon Bay is 43 miles north of Green Bay. What is the distance between Green Bay and Gills Rock?

5. What is the distance between Gills Rock and Jacksonport? Between Jacksonport and Sturgeon Bay?

Jim learned the distances from Madison to some other Wisconsin cities. He made a chart like the one below. Use the chart to answer these questions:

Distance from Madison to	
Milwaukee	75 miles
Green Bay	123 miles
La Crosse	115 miles
Kenosha	84 miles
Superior	277 miles
Beloit	42 miles

6. How much farther is it from Madison to Superior than it is from Madison to Milwaukee?

7. What is the distance from Kenosha to Madison and then on to Beloit?

8. How much nearer to Madison is La Crosse than Green Bay? Kenosha than La Crosse? Green Bay than Superior?

Practice in Addition and Subtraction

Find the answers for these addition examples. Add down. Then check your answer by adding up:

Add:

1.

3	5	8	9	6	7	4	8	3	9	5	2
6	4	6	3	7	8	9	5	8	9	7	8

2.

5	9	30	7	6	58	2	19	94	8
3	4	5	44	9	8	9	97	8	59
8	7	4	5	83	7	74	8	5	96

3.

20	14	52	30	19	25	48	37	$.29
15	50	73	41	16	12	64	59	.35
32	20	42	52	28	30	86	73	.67
21	14	80	63	35	19	20	95	.98

4.

534	73	845	39	526	87	768	$9.49
32	465	64	356	97	948	59	.75

5.

210	832	174	640	318	803	175	$4.95
135	300	240	852	124	517	295	6.50
302	524	183	470	205	731	100	3.89
240	632	291	325	143	408	389	5.00

Subtract each of the following examples. Check each answer by adding the subtrahend and the difference.

6.

7	9	8	10	17	15	12	14	16	18
4	6	2	7	8	7	5	6	7	9

7.

19	78	56	82	47	63	25	90	$.74
2	3	6	3	9	5	7	4	.08

8.

58	40	75	60	82	34	67	43	$.96
32	20	45	17	36	25	19	28	.47

9.

375	517	702	694	853	420	715	$9.08
65	40	37	68	46	73	89	.59

10.

789	406	675	564	907	831	350	$5.00
543	320	192	406	238	654	219	1.65

Should You Add or Subtract?

A problem may ask a question which you can answer by finding how many in all. You know that when you need to find *how many in all* you should *add.*

Problems may ask questions like these: *How many more? How many fewer? How much less? How many are gone? How many are left?* or *How many in the other group?* You know that you can answer such questions by finding the difference between the two numbers in the problem. You know that to *find the difference* you should *subtract.*

Read each problem below to find what it tells and what question it asks. Decide what the question means. Write A if you should add or S if you should subtract to find the answer. Then write the example and find the answer. Remember:

If the question means:	*Then do this:*
> Find how many in all	Add
> Find the difference	Subtract

1. Howard had $19 in his savings account. He withdrew $7. How much money was left in his account?

2. Betty had $37 in her savings account and put in $8 more. How much money did she have in her account then?

3. Walter needs $1.83 for a history book. He has only $1.25. How much more money does he need?

4. Jerry and his mother paid $.50 for peaches, $.35 for oranges, and $2.89 for meat. How much did they spend?

5. Martha made 24 sandwiches for the class picnic. The children ate all but 6 sandwiches. How many did they eat?

6. Dick's father drove his car 97 miles on Monday, 114 miles on Tuesday, and 217 miles on Wednesday. How many miles did he drive altogether in those three days?

7. Doris gave the clerk $5.00 for a drawing set which cost $3.29. How much change should Doris get?

The Roadside Stand

Bob helps his mother wait on customers who come to the roadside stand to buy fruits and vegetables. The problems below are about the stand. For each problem write A if you should add, or S if you should subtract. Then find the answer.

1. Bob sold the lady a basket of apples, an acorn squash, and a melon. How much should he charge?

2. One woman bought a basket of tomatoes and a basket of apples. What was the total cost?

3. How much more is the price of a basket of tomatoes than the price of a basket of apples?

4. Bob sold melons as follows: Monday, 19; Tuesday, 27; Wednesday, 35; Thursday, 18; and Friday, 21. How many melons did he sell in all those five days?

5. The total number of melons sold in one week was 104. The next week the number was 79. What was the difference?

6. One customer bought a basket of apples and gave Bob a $5 bill. How much change should the customer get?

7. Bob had 87 melons to sell. He sold 69 melons. How many were left?

8. How much should Bob charge for an acorn squash, a melon, and a basket of tomatoes?

9. Bob sold 175 melons in August and 319 in September. How many more were sold in September than in August?

Problems to Solve

Read each problem carefully. Decide whether to add or subtract and write A or S. Then solve the problem.

1. Jane bought a 23¢ loaf of bread and gave the clerk 50¢. How much change should she get?

2. Betty's mother bought a cake, a pie, and a loaf of bread for $1.87. What change should she receive from $5.00?

3. What is the cost of a dozen rolls at 72¢ a dozen and a 75¢ cake?

4. How much should Janet pay for a 23¢ loaf of bread and a pie that costs 45¢ ?

5. Jim knew that all but 42 of the 575 seats in the auditorium were filled. How many persons were present?

6. Betty saved $1.25 and bought a book that cost $.60. How much money did she have left?

7. John's father weighs 196 pounds. John weighs 89 pounds. How many pounds less does John weigh than his father?

8. Robert would like to buy a book that costs $1.25. He has saved $.69. How much more money does he need?

9. Herbert's father drove his car as follows: Sunday, 180 miles; Monday, 125 miles; Tuesday, 217 miles; Wednesday, 226 miles. How far did he drive in all?

10. Each week Ellen receives $.85 for carfare and $.95 for lunches at school. What is the total amount of her allowance?

11. Tom had $2.98. He bought a bat and a ball for $1.69. How much money did he have left?

12. Tom's mother bought him a shirt for $2.25 and a pair of shoes for $4.85. How much did she spend altogether?

13. Nancy paid $1.98 for meat, 99¢ for sugar, and 75¢ for potatoes. What was the total cost of these things?

14. Doris weighs 77 pounds. Her sister Joan weighs 109 pounds. How much more does Joan weigh than Doris?

Add and check:

1.	9	7	4	3	8	9	6	5	6	8	2	4
	5	3	7	8	6	7	7	8	5	4	9	6

2.	94	73	34	32	84	63	638	282	355
	5	9	8	45	90	27	25	479	967

3.	8	19	98	24	40	86	39	392	455
	8	8	8	14	24	80	16	95	380
	6	8	7	10	30	92	218	523	726
	6	9	9	22	25	87	410	69	192

Subtract and check:

4.	15	14	11	14	12	17	13	16	10	11
	7	9	6	7	9	8	4	7	6	3

5.	17	38	66	95	879	337	902	536	327
	4	9	32	88	85	68	84	23	148

Read each problem carefully. Decide what to do to answer the question it asks. Write A if you should add, or S if you should subtract. Then find the answer.

6. Jane had \$.25 and bought an \$.08 ice cream cone. How much money did she have left?

7. The girls made sandwiches for a party. Jane made 12, Ann made 10, Judy made 12, and Betty made 24. How many sandwiches did the girls make in all?

8. Bob can buy a new book for \$1.25 and a second-hand book for \$.69. How much cheaper is the second-hand book?

9. Mary spent \$1.75 for a game and \$1.98 for a book. How much did she spend for both?

10. John's uncle sent him 325 European stamps. He used 250 of them. How many were left?

11. Betty's sister bought a dress for \$7.95 and a hat for \$2.35. How much did she spend altogether?

To Help You Remember

The page numbers following each question, example, or problem show you where to turn if you need help.

▶ *To think and talk about:*

1. What does each zero in the number 50,010 mean? (6)

2. When do you add to solve a problem? (27)

3. What are the names of the periods in this number: 547,313,127? Why are commas used in writing it? (7)

4. In the addition example, $4 + 5 = 9$, which numbers are addends and which is the sum? (8)

5. In the subtraction example, $9 - 4 = 5$, which number is the subtrahend? The difference? The minuend? (17)

6. If you forget the answer to an addition fact, how can you find it? (8)

7. If you forget the answer to a subtraction fact, how can you find it? (18)

8. What must you do before you can subtract in an example like this one: $407 - 48$? (22)

9. What kinds of problem-questions can be answered by subtracting? (27)

▶ *To think about and write:*

Find the answers. Check your work.

1. $\begin{array}{r} 39 \\ 67 \\ +48 \end{array}$ (11)

2. $\begin{array}{r} 96 \\ 8 \\ +9 \end{array}$ (10)

3. $237 + 426 + 109 = ?$ (13)

4. $19 + 325 + 26 = ?$ (13)

5. $\begin{array}{r} 93 \\ +7 \end{array}$ (9)

6. $\begin{array}{r} 76 \\ -9 \end{array}$ (20)

7. $\begin{array}{r} 315 \\ -80 \end{array}$ (22)

8. $\begin{array}{r} 728 \\ +98 \end{array}$ (13)

9. $\begin{array}{r} 73 \\ -29 \end{array}$ (21)

10. $\begin{array}{r} 75 \\ +67 \end{array}$ (11)

11. $\begin{array}{r} 602 \\ -437 \end{array}$ (22)

12. $\begin{array}{r} 675 \\ +598 \end{array}$ (13)

13. Find the cost of a basketball at \$5.79, and a basketball basket at \$1.98. (13-14)

Testing Yourself

Find the answers. Work quickly, but take time to make sure you get the right answers.

Add and check:

1.

4	7	5	9	9	7	9	5	4	5	6	8
9	6	7	3	6	8	8	4	3	5	5	6

2.

32	89	98	93	87	366	972	643	475
7	7	6	88	13	56	45	578	839

3.

7	7	6	35	25	41	31	512	297
8	6	87	30	20	30	72	613	580
5	4	9	51	18	16	18	894	435
9	54	9	32	24	20	9	327	164

Subtract and check:

4.

11	13	15	12	15	13	17	14	10	14
9	5	9	6	8	8	9	6	7	8

5.

92	27	67	48	690	985	957	115	734
8	3	59	37	40	68	83	31	295

Solve these problems:

6. John and Jack each deliver papers after school. One day John delivered 85 papers and Jack delivered 74. How many papers did both boys deliver that day?

7. Judy plans to color 24 eggs for Easter. She has colored 9 eggs. How many more does she still need to color?

8. Ray picked 37 boxes of berries and Dan picked 19. How many fewer boxes were picked by Dan than by Ray?

9. Jack spent money for school books as follows: Arithmetic, $1.68; Reading, $2.36; Health, $1.84; English, $2.04. How much money did Jack spend for school books?

10. In one week the fifth graders sold all but 105 of the 350 tickets for their fall concert. How many did they sell that week?

Chapter 3

At the Picnic

1. The children shown in the picture are eating a picnic lunch. They are using 3 tables, with 4 children at each table. How many children are eating lunch at the tables?

You can find the answer by adding three 4's.

The quick way to find the answer is to *multiply* 4 by 3 to find *how many in all the equal groups.*

4 addend	4 multiplicand
4 addend	×3 multiplier
+4 addend	12 product
12 sum	

In a multiplication example the *multiplicand* shows the size of each equal addend, or equal group. The *multiplier* shows the number of such groups. The answer, or *product*, is like the sum of the equal addends. It shows how many in all the equal groups. The multiplication sign (×) is called the *times sign*. $3 \times 4 = 12$ is read, 3 *times* 4 *equals* 12.

Now find the answer for this problem:

2. Margaret served 3 cookies on each of 7 plates. How many cookies did she use?

You will remember:

- Multiplication is a quick way of adding equal addends.

Practicing the Multiplication Facts

These examples with their answers are the 81 multiplication facts. Make sure that you can say and write the answers quickly.

1.	5	1	4	3	2	5	3	4	2
	4	7	2	9	5	1	8	6	3
2.	3	2	5	1	4	2	4	5	1
	2	9	6	2	8	2	7	3	5
3.	4	3	2	2	1	3	2	4	3
	1	3	7	1	3	7	4	9	4
4.	1	6	3	4	5	1	2	3	4
	8	4	5	3	2	6	8	1	5
5.	3	4	5	1	5	2	1	5	1
	6	4	7	9	8	6	1	9	4
6.	9	6	8	7	6	8	7	8	6
	9	1	5	7	8	1	3	6	5
7.	7	8	9	6	8	7	6	8	9
	9	3	1	3	9	2	6	4	3
8.	6	9	8	7	9	5	7	8	7
	2	7	8	1	4	5	4	2	5
9.	9	6	9	7	9	8	7	9	6
	8	7	2	8	5	7	6	6	9

10. You can find the answer to any of the above examples by adding, $3 \times 8 = ?$ $8 + 8 + 8 = 24$. So $3 \times 8 = 24$.

11. You can also find the answer by counting, like this:

by 2's: 2, 4, 6, 8, 10, 12, 14, 16, 18.
by 3's: 3, 6, 9, 12, 15, 18, 21, 24, 27.
by 4's: 4, 8, 12, 16, 20, 24, 28, 32, 36.

12. Count by 5's, 6's, 7's, 8's, and 9's. Why do you never have to add or count a number more than 9 times?

Multiplying Two-Place Numbers

1. The directions below tell you how to work these examples. Study them carefully. Explain how to find each answer.

A	B	C	D	E	F
T | O	T | O	H | T | O	T | O	H | T | O	
4 | 3	2 | 0	6 | 2	2 | 5	3 | 8	$.74
× | 2	× | 3	× | 4	× | 3	× | 5	×3
8 | 6	6 | 0	2 | 4 | 8	7 | 5	1 | 9 | 0	$2.22

A. Multiply the ones, and then multiply the tens.

B. There are no ones to multiply, so write zero in ones' place. Then multiply the tens.

C. Multiply the ones and then multiply the tens. Change 20 tens to 2 hundreds.

D. 3 × 5 ones = 15 ones. Change 10 ones to 1 ten. 3 × 2 tens = 6 tens. 6 tens + 1 ten remembered = 7 tens.

E. 5 × 8 ones = 40 ones. Change 40 ones to 4 tens. 5 × 3 tens = 15 tens. 15 tens + 4 tens remembered = 19 tens. Change 10 tens to 1 hundred.

F. This example is worked like example E. Be sure to use the dollar sign and cents point correctly.

To check your answer in multiplication, multiply again very carefully.

Work these multiplication examples and check each answer.

2.	42	13	33	21	22	30	40	20	10	$.30
	× 2	× 3	× 3	× 4	× 4	× 3	× 2	× 4	× 8	× 2
3.	53	70	92	63	81	40	72	51	83	$.91
	× 2	× 5	× 4	× 3	× 9	× 8	× 4	× 9	× 3	× 9
4.	15	26	29	17	18	19	38	19	35	$.28
	× 2	× 3	× 2	× 5	× 4	× 5	× 2	× 4	× 2	× 3
5.	49	75	56	83	94	68	45	92	59	$.98
	× 3	× 4	× 7	× 6	× 8	× 5	× 8	× 6	× 4	× 9

Multiplying Three-Place Numbers

1. To work each example below, you first multiply the ones, next the tens, and then the hundreds. Study the completed examples. Use the helps. Explain how each answer was found.

A	B	C	D	E	F	G	H
123	502	263	451	239	317	158	837
×3	×4	×2	×9	×2	×5	×6	×7
369	2008	526	4059	478	1585	948	5859

- Sometimes you have to change ones to tens and add them to the product of the tens.
- Sometimes you have to change tens to hundreds and add them to the product of the hundreds.
- In some of the examples you have to change ones to tens, and also change tens to hundreds.
- In some examples you have to change hundreds to thousands.

Find these products and check your answers:

2.	314 × 2	110 × 8	233 × 3	440 × 2	710 × 4	944 × 2	603 × 3	$5.00 × 5
3.	284 × 2	453 × 2	231 × 4	290 × 3	863 × 3	752 × 4	991 × 3	$4.90 × 6
4.	326 × 3	219 × 4	108 × 9	227 × 3	913 × 7	837 × 2	416 × 6	$7.09 × 4
5.	375 × 2	259 × 3	467 × 2	198 × 5	287 × 3	125 × 7	119 × 6	$1.15 × 8
6.	934 × 3	298 × 9	789 × 2	445 × 5	823 × 6	426 × 9	657 × 2	$9.25 × 7

You will remember:

- You multiply *hundreds* or *tens* in the same way that you multiply *ones*.

Questions Answered by Multiplication

1. Nancy is putting pictures in her picture book. There are 5 blank pages in the book. She can put 4 pictures on each page. How many pictures can she put on the five blank pages?

There are to be 4 pictures on each page, so you know that the groups will be equal. You know that there will be 5 such equal groups. The question means find how many in all the equal groups. You multiply to find the answer. $5 \times 4 = ?$

Now solve these problems.

2. A big truck travels 9 miles on a gallon of gasoline. How far can it travel on 8 gallons?

3. One of the school buses travels 35 miles each day. How far will it travel in 5 days?

4. Find the cost of 4 cans of fruit juice at 29¢ a can.

5. Mr. Brown drove his car at a speed of 45 miles per hour. How far could he travel in 4 hours?

Did you discover that each problem above:

- Told you *how many* or how much *in each equal group?*
- Told you *how many equal groups?*
- Asked you a question that meant that you should *find how many in all of the equal groups?*

You will remember:

- To find *how many in all the equal groups,* you *multiply.*

Understanding Division

1. Below are two multiplication facts and two division facts. Study these facts. Notice how they are related.

7 multiplicand ×5 multiplier 35 product	5 quotient divisor 7)35 dividend
or	or
5 multiplicand ×7 multiplier 35 product	7 quotient divisor 5)35 dividend

The *product* in each multiplication fact is like the *dividend* in the division fact beside it.

The *multiplicand* and the *multiplier* are like the *divisor* and the *quotient.*

Since you know that $5 \times 7 = 35$ or $7 \times 5 = 35$ you also know that $35 = 5 \times 7$ or $35 = 7 \times 5$.

In division, we think $35 = 5 \times 7$, and we write $35 \div 7 = 5$; or we think $35 = 7 \times 5$ and we write $35 \div 5 = 7$.

You can see that knowing multiplication facts will help you remember the division facts.

Use the multiplication facts below to find the answers for the division facts, like this: $3 \times 2 = 6$ or $2 \times 3 = 6$, so $6 = 3 \times 2$ or $6 = 2 \times 3$. Then $6 \div 2 = 3$ or $6 \div 3 = 2$.

2. $3 \times 2 = 6$ $2\overline{)6}$ $3\overset{?}{\overline{)6}}$

3. $6 \times 5 = 30$ $5\overset{?}{\overline{)30}}$ $6\overset{?}{\overline{)30}}$

4. $9 \times 1 = 9$ $1\overline{)9}$ $9\overline{)9}$

5. $9 \times 4 = 36$ $4\overline{)36}$ $9\overline{)36}$

6. $5 \times 3 = 15$ $3\overline{)15}$ $5\overline{)15}$

7. $6 \times 7 = 42$ $7\overline{)42}$ $6\overline{)42}$

8. $4 \times 6 = 24$ $6\overline{)24}$ $4\overline{)24}$

9. $8 \times 5 = 40$ $5\overline{)40}$ $8\overline{)40}$

10. $7 \times 8 = 56$ $8\overline{)56}$ $7\overline{)56}$

11. $9 \times 8 = 72$ $8\overline{)72}$ $9\overline{)72}$

12. $7 \times 7 = 49$ $7\overline{)49}$

13. $4 \times 4 = 16$ $4\overline{)16}$

14. $5 \times 5 = 25$ $5\overline{)25}$

15. $9 \times 9 = 81$ $9\overline{)81}$

Practicing the Division Facts

The examples below together with their answers are the 81 division facts. Make sure that you can write the answers quickly. Be sure that you know all the division facts. You will use these facts in working division examples.

1. $3\overline{)18}$ Think: $18 = 6 \times 3$. Then you know that $18 \div 3 = 6$.

2.	$9\overline{)9}$	$2\overline{)4}$	$1\overline{)3}$	$6\overline{)6}$	$2\overline{)8}$	$1\overline{)8}$	$4\overline{)8}$	$7\overline{)7}$
3.	$3\overline{)6}$	$4\overline{)4}$	$3\overline{)9}$	$2\overline{)6}$	$5\overline{)5}$	$1\overline{)1}$	$1\overline{)2}$	$3\overline{)3}$
4.	$1\overline{)9}$	$1\overline{)4}$	$8\overline{)8}$	$1\overline{)5}$	$1\overline{)6}$	$1\overline{)7}$	$2\overline{)2}$	$4\overline{)28}$
5.	$4\overline{)20}$	$9\overline{)36}$	$6\overline{)12}$	$8\overline{)48}$	$4\overline{)36}$	$7\overline{)28}$	$9\overline{)45}$	$4\overline{)16}$
6.	$8\overline{)24}$	$9\overline{)81}$	$8\overline{)16}$	$5\overline{)20}$	$8\overline{)72}$	$8\overline{)64}$	$5\overline{)45}$	$2\overline{)18}$
7.	$7\overline{)35}$	$3\overline{)12}$	$9\overline{)54}$	$2\overline{)14}$	$7\overline{)42}$	$5\overline{)25}$	$9\overline{)18}$	$6\overline{)54}$
8.	$6\overline{)42}$	$6\overline{)18}$	$8\overline{)32}$	$7\overline{)49}$	$7\overline{)21}$	$8\overline{)40}$	$9\overline{)72}$	$8\overline{)56}$
9.	$4\overline{)12}$	$7\overline{)56}$	$9\overline{)27}$	$9\overline{)63}$	$2\overline{)12}$	$6\overline{)30}$	$5\overline{)40}$	$6\overline{)24}$
10.	$4\overline{)32}$	$3\overline{)15}$	$7\overline{)63}$	$3\overline{)27}$	$2\overline{)10}$	$4\overline{)24}$	$5\overline{)10}$	$6\overline{)48}$
11.	$2\overline{)16}$	$7\overline{)14}$	$5\overline{)30}$	$3\overline{)21}$	$5\overline{)15}$	$6\overline{)36}$	$3\overline{)24}$	$5\overline{)35}$

You can find the answer for any of the examples above by counting equal groups, like this:

For $7\overline{)42}$ think: $42 = ? \times 7$. Count by 7's to 42. Count this way: 7, 14, 21, 28, 35, 42. You have counted 6 equal groups. $42 = 6 \times 7$, so $42 \div 7 = 6$.

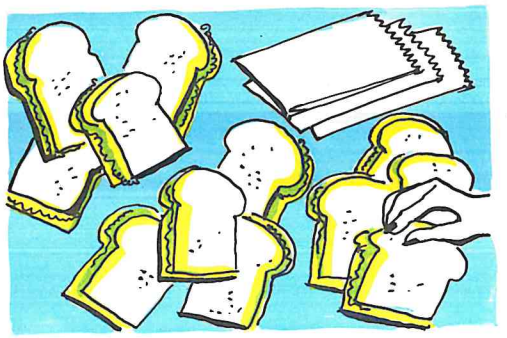
Write the answers for these problems:

12. If 24 bars of soap are placed in boxes with 6 bars in each box, how many boxes will be needed?

13. A motor boat traveled 40 miles in 5 hours. What was its average speed per hour?

Questions Answered by Division

1. Jane's mother made 12 sandwiches. If she puts 4 sandwiches into each bag, how many bags will she use?



You know that there are 12 sandwiches in all. You know that there will be 4 sandwiches in each group.

To answer the question in the problem, you will have to find how many groups of 4 equal 12.

Think: $12 = 3 \times 4$ so $4\overline{)12}^{\,3}$.

You can solve each of the problems below by finding how many equal groups. Think each answer and write it. Do not write the example.

2. There are 32 children who want to play a circle game. With 8 children in each circle, how many circles will there be?

3. Bob counted 25 books on the table. He put them into piles with 5 books in each pile. How many piles did he make?

4. With 28¢ how many 4-cent pencils can I buy?

5. Esther's mother bought a package of 24 envelopes. If she uses 4 envelopes each week, how many weeks will they last?

6. How many 3¢ postage stamps can Joyce buy for 27¢?

7. Louis has 54 tulip bulbs. If he plants 9 bulbs in a row, how many such rows can he plant?

8. Sally has 45¢. How many 5¢ cupcakes can she buy?

Did you discover that each problem above:

- Told you *how many*, or *how much in all?*
- Told you *how many*, or *how much in each equal group?*
- Asked you a question that meant that you were to *find how many equal groups?*

You will remember:

- To find *how many equal groups*, you *divide.*

Other Questions Answered by Division

1. Jim has 12 plants. He wants to divide them equally among 3 flower boxes. How many should he put in each box?

You know that there are 12 plants in all. You know that there will be 3 equal groups or boxes of plants.

To answer the question in the problem, you must divide to find how many in each of 3 boxes.

Think: $12 = 3 \times 4$ so $3\overline{)12}^{\,4}$.

Solve each problem below by finding *how many in each equal group*. Think the answer for each problem and write it. Do not write the example.

2. Five boys divided 30 plums equally among themselves. How many plums did each boy get?

3. In the music room there were 42 chairs placed in 6 equal rows. How many chairs were there in each row?

4. John has a board that is 16 feet long. He wants to cut it into 4 equal pieces. How long should each piece be?

5. Ray picked 56 pounds of tomatoes. If he puts them into 8 baskets with the same number of pounds in each, how many pounds of tomatoes will there be in each basket?

6. Mary's mother bought 3 cans of soup for 27¢. How much per can did the soup cost?

Did you discover that each problem above:

- Told you *how many*, or *how much in all?*
- Told you *how many equal groups?*
- Asked a question that meant that you should *find how many*, or *how much in each equal group?*

You will remember:

- To find *how many in each equal group*, you *divide.*

Division with a Remainder

In some examples the dividend cannot be divided evenly by the divisor. In such examples, you will have some of the dividend left after you divide.

1. Robert has a 7-foot board which he is going to cut into pieces 2 feet long. How many 2-foot pieces will he have? How much of the board will be left?

Long Way	Short Way
3 r1	3 r1
$2\overline{)7}$	$2\overline{)7}$
6	
1	

You know that $6 = 3 \times 2$ and that $6 \div 2 = 3$. It is easy to see that $7 = 3 \times 2$ and 1 left. The part of the dividend that is left is called the *remainder*. It is written to the right of the quotient after the letter r, which is the abbreviation for remainder.

The example may be worked in the *short way* by thinking the multiplication and the subtraction without writing it.

Learn to find the answers for these examples quickly and correctly, using the short way.

2. $2\overline{)3}$ $3\overline{)4}$ $4\overline{)5}$ $5\overline{)6}$ $6\overline{)7}$ $7\overline{)8}$ $3\overline{)5}$ $8\overline{)9}$ $4\overline{)6}$

3. $7\overline{)9}$ $4\overline{)7}$ $5\overline{)8}$ $6\overline{)9}$ $5\overline{)9}$ $2\overline{)5}$ $3\overline{)7}$ $4\overline{)9}$ $3\overline{)8}$

To find the answer for an example like $6\overline{)45}$, think of the next smaller number that can be divided evenly by 6. You know that $42 = 7 \times 6$. Then $45 - 42 = 3$. The answer is 7, remainder 3. Examples like this one can be worked the short way as shown at the right above.

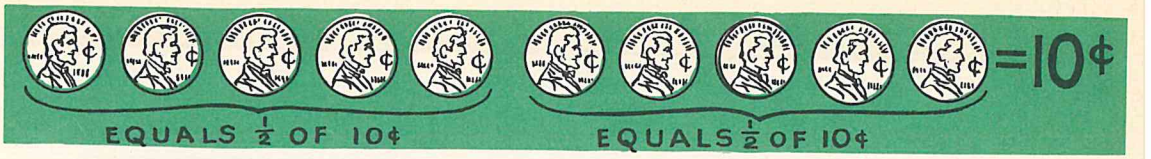
7 r3	7 r3
$6\overline{)45}$	$6\overline{)45}$
42	
3	

Find the answers for these examples the short way:

4. $4\overline{)39}$ $2\overline{)15}$ $5\overline{)37}$ $3\overline{)17}$ $3\overline{)25}$ $5\overline{)28}$ $6\overline{)49}$ $4\overline{)11}$

5. $6\overline{)52}$ $7\overline{)15}$ $7\overline{)29}$ $7\overline{)53}$ $7\overline{)68}$ $8\overline{)19}$ $8\overline{)34}$ $8\overline{)59}$

6. $8\overline{)70}$ $9\overline{)19}$ $9\overline{)29}$ $9\overline{)37}$ $9\overline{)55}$ $9\overline{)59}$ $9\overline{)70}$ $9\overline{)83}$



Thinking about Fractions

1. Study the picture above. You know that $\frac{1}{2}$ is a *fraction*. In a fraction the number above the line is called the *numerator*. The number below the line is called the *denominator*. In $\frac{1}{2}$ the numerator is 1 and the denominator is 2.

2. In the fractions $\frac{1}{4}$, $\frac{1}{5}$, $\frac{3}{8}$, $\frac{5}{7}$, and $\frac{8}{9}$, which numbers are the numerators? Which numbers are the denominators?

You know that in $\frac{1}{2}$ the numerator is 1 and the denominator is 2. The denominator, 2 tells you that a whole thing or group has been divided into 2 equal parts. The numerator, 1, tells you that we are thinking of 1 of these equal parts.

3. Study the picture below. The fraction $\frac{2}{3}$ means that a whole thing or group has been divided into 3 equal parts and that we are thinking of 2 of these equal parts.

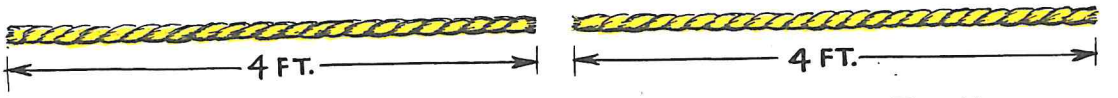
4. In each of the fractions below, what is the numerator and what is the denominator? What does each fraction mean?

$\frac{1}{4}$ $\frac{1}{5}$ $\frac{3}{8}$ $\frac{5}{7}$ $\frac{8}{9}$ $\frac{3}{4}$ $\frac{5}{8}$ $\frac{1}{12}$ $\frac{3}{10}$ $\frac{4}{5}$ $\frac{5}{9}$ $\frac{4}{15}$

5. The numerator and the denominator are called the *terms* of the fraction. The terms of the fraction $\frac{7}{8}$ are 7 and 8. What are the terms of each fraction above?

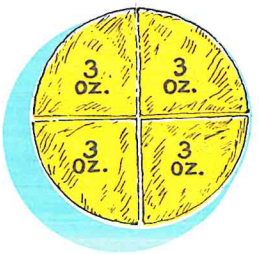
Now you have learned:

- The *terms* of a fraction are the *numerator* and the *denominator*.
- The denominator of a fraction tells the number of equal parts into which something has been divided. The numerator tells how many of those equal parts we are thinking about.



More about Fractions

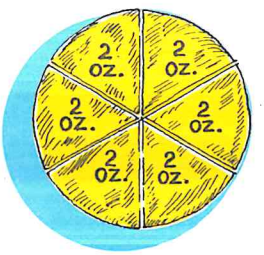
1. Study the picture at the top of the page. The rope shown in the picture above was 8 feet (ft.) long. Tom cut it into 2 equal pieces. The 2 pieces are equal because each piece is 4 feet long. Do you see that each piece of the rope is equal to $\frac{1}{2}$ of the whole rope? Do you see that $\frac{1}{2} + \frac{1}{2}$, or $\frac{2}{2}$ of the rope, are equal to the whole rope?



2. At the left is a picture of a box filled with cheese. The cheese in the box weighs 12 ounces (oz.). There are 4 equal pieces of cheese in the box. Why can you be sure that the 4 pieces of cheese in the box are equal? Is each piece equal to $\frac{1}{4}$ of the cheese in the box? Do you see that $\frac{4}{4}$ of the cheese in the box is equal to the whole box of cheese?

3. The fishing rod in the picture below is 9 feet long.

In how many pieces was the fishing rod made? Are the pieces of equal length? How do you know the 3 pieces are of equal length? Each piece is equal to what fraction of the whole rod? Are $\frac{3}{3}$ of the rod equal to the whole rod?



4. Look at the picture at the left. The cheese in this box weighs 12 ounces. How do you know that the 6 pieces of cheese in the box are equal? 1 of the pieces is equal to what fraction of the cheese in the box? 5 of the pieces are equal to what fraction of the whole box of cheese? Are 6 pieces, or $\frac{6}{6}$ of the cheese in the box, equal to the whole box of cheese?

Now you have learned:

- $\frac{2}{2}$, $\frac{3}{3}$, $\frac{4}{4}$, or $\frac{6}{6}$ of a number are equal to that number.

Finding Fractional Parts

1. Doris bought 12 cookies. She wants to put $\frac{1}{4}$ of them in her lunch. How many cookies should she put in her lunch?

You know that to find $\frac{1}{4}$ of any number, you divide the number by 4. We divide 12 by 4 to answer the question.

$\frac{1}{4}$ of 12 = ? $\quad 12 \div 4 = 3, \quad$ so $\frac{1}{4}$ of 12 = 3.

Since $\frac{1}{4}$ of 12 = 3, Doris should put 3 cookies in her lunch.

In the problem above, 12 is the total number of cookies, or the *whole quantity*. $\frac{1}{4}$ is the *fraction*. The answer, 3, is the *fractional part* of 12 cookies.

2. Doris put $\frac{1}{4}$ of the cookies in her lunch. She has $\frac{3}{4}$ of 12 cookies left. How many cookies are left?

$\frac{1}{4}$ of 12 = 3, $\quad$ so $\frac{3}{4}$ of 12 = 3 × 3 = 9. $\quad \frac{3}{4}$ of 12 = 9.

Since $\frac{3}{4}$ of 12 = 9, Doris had 9 cookies left.

In problem 2 what was the *whole quantity?* What was the *fraction?* What was the *fractional part?*

Find these fractional parts:

3. $\frac{1}{3}$ of 24 = ? $\quad \frac{1}{5}$ of 45 = ? $\quad \frac{2}{3}$ of 27 = ? $\quad \frac{2}{7}$ of 21 = ?

4. $\frac{5}{6}$ of 54 = ? $\quad \frac{3}{4}$ of 36 = ? $\quad \frac{1}{6}$ of 48 = ? $\quad \frac{5}{8}$ of 40 = ?

5. $\frac{2}{5}$ of 30 = ? $\quad \frac{8}{9}$ of 18 = ? $\quad \frac{1}{9}$ of 45 = ? $\quad \frac{4}{5}$ of 25 = ?

6. $\frac{1}{3}$ of 12 = ? $\quad \frac{1}{3}$ of 18 = ? $\quad \frac{1}{3}$ of 24 = ? $\quad \frac{1}{3}$ of 27 = ?

7. What is the difference between the fractional part in $\frac{1}{3}$ of 9 = ? and the fractional part in $\frac{1}{3}$ of 21 = ?

Now you have learned:

- To find a fractional part of a number, *divide the number by the denominator* of the fraction and *multiply the quotient by the numerator.*

Find the answers for the examples below. Watch the signs.

1.

4	18	8	16	40	354	493	$2.43
7	9	97	21	84	601	225	5.84
+6	+5	+4	+42	+53	+38	+726	+1.16

2.

43	82	26	67	29	713	912	432	$2.13
×2	×4	×3	×5	×6	×3	×7	×8	×9

3.

47	56	34	367	175	277	767	$4.06
−4	−8	−18	−54	−84	−69	−288	−2.77

4. $6\overline{)48}$ $7\overline{)56}$ $5\overline{)35}$ $9\overline{)63}$ $6\overline{)56}$ $4\overline{)30}$ $8\overline{)51}$ $3\overline{)29}$

Find the missing numbers:

5. $\frac{1}{3}$ of $9¢ = ?\ ¢$ **6.** $\frac{3}{8}$ of $40 = ?$ **7.** $\frac{3}{5}$ of $\$25 = \$\ ?$

8. $\frac{2}{3}$ of $21¢ = ?\ ¢$ **9.** $\frac{5}{6}$ of $30 = ?$ **10.** $\frac{3}{4}$ of $36 = ?$

Solve these problems:

11. Sue wants to buy a sweater that costs $3.25. She has saved $1.98. How much more money does Sue need?

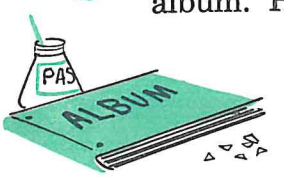
12. Ray's father needs 4 tons of coal that costs $20 a ton. How much must he pay for the coal?

13. Julia has read three storybooks. One had 208 pages, another 192 pages, and the other 288 pages. How many pages in all did Julia read in the three books?

14. The 35 children in the fifth grade plan to ask their mothers to take them to the park in cars. If 5 children ride in each car, how many cars will be needed?

15. Each table at the park will seat 6 persons. If the children plan for 40 persons, how many full tables will they have and how many persons will be at another table?

16. Joan had 24 pictures she had taken on her vacation trip. She wants to put $\frac{1}{4}$ of them on each page in her photograph album. How many pictures should she put on each page?



To Help You Remember

The page numbers after the questions on this page tell you where to turn for help if you need it.

▶ *To think and talk about:*

1. Explain how to check a multiplication example. (35)

2. What problem question is answered by multiplication? (37)

3. Which multiplication fact would help you to understand the division example $54 \div 6$? How would it help you? (38)

4. In this division fact, $40 \div 5 = 8$, what is each number called? (38)

5. What two problem questions are answered by division? (40-41)

6. What is each number called in the fraction $\frac{7}{8}$? (43)

7. Explain how to find a fractional part of a number. (45)

8. Explain how to work this example in two ways: $9 \div 2$. (42)

▶ *To think about and write:*

Find the answers for these examples:

1. $\begin{array}{r} 8 \\ \times 7 \end{array}$ (34)

2. $\begin{array}{r} 24 \\ \times 5 \end{array}$ (35)

3. $8\overline{)72}$ (39)

4. $6\overline{)55}$ (42)

5. $\begin{array}{r} 275 \\ 127 \\ +364 \end{array}$ (13)

6. $\begin{array}{r} 26 \\ 13 \\ +175 \end{array}$ (13)

7. $\begin{array}{r} 479 \\ -187 \end{array}$ (22)

8. $\begin{array}{r} 245 \\ \times 8 \end{array}$ (36)

9. Find the fractional parts: (45)

$\frac{5}{8}$ of $32 = ?$ $\quad$ $\frac{2}{3}$ of $27 = ?$ $\quad$ $\frac{5}{6}$ of $42 = ?$ $\quad$ $\frac{4}{5}$ of $30 = ?$

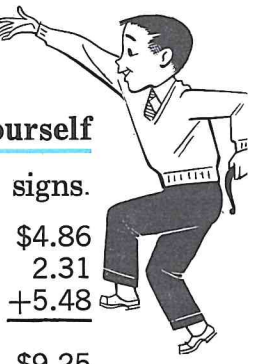
10. Read this problem and write:

(a) What the problem tells you

(b) What question the problem asks

(c) How you will solve the problem

An airplane pilot makes 4 trips a week. Each trip is 922 miles. How far does he fly each week? (37)



Testing Yourself

Find the answers for these examples. Watch the signs.

1.	8	8	27	72	82	876	326	312	$4.86
	2	35	65	58	44	32	875	694	2.31
	+4	+41	+42	+14	+28	+57	+96	+759	+5.48
2.	32	13	84	93	45	232	325	157	$9.25
	×3	×7	×2	×5	×9	×4	×2	×6	×7
3.	89	23	89	27	375	108	920	890	$4.00
	−6	−7	−45	−19	−89	−89	−540	−199	−1.99

4. $8\overline{)56}$ $6\overline{)42}$ $7\overline{)63}$ $9\overline{)72}$ $4\overline{)39}$ $5\overline{)43}$ $7\overline{)51}$ $8\overline{)67}$

5. $\frac{1}{2}$ of 10 = ? **6.** $\frac{3}{4}$ of 20 = ? **7.** $\frac{1}{8}$ of 32 = ?

8. $\frac{3}{8}$ of 32 = ? **9.** $\frac{3}{5}$ of 25 = ? **10.** $\frac{5}{6}$ of 24 = ?

Solve these problems:

11. Janet weighs 101 pounds and Tom weighs 93 pounds. How many pounds heavier is Janet than Tom?

12. Some of the boys carried 18 chairs into each of 5 classrooms. How many chairs did they carry in all?

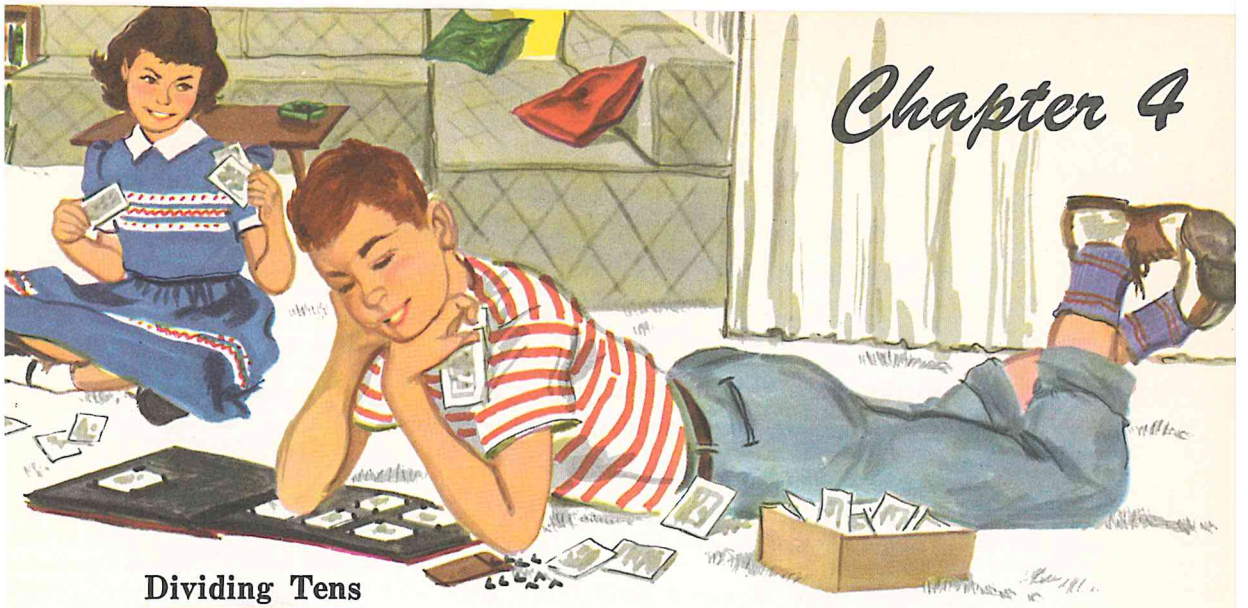
13. As class treasurer, Joan collected $1.35 on Monday, $2.50 on Tuesday, and $.75 on Wednesday. How much money did she collect in all?

14. The children paid 45¢ for 9 packages of small paper plates. What was the cost of each package?

15. The girls had 50 sandwiches to put into 6 boxes for their Girl Scout picnic. They put the same number into each box. How many sandwiches did they put into each box and how many were left?

16. After the picnic there were 45 empty pop bottles to be put into cartons. Each carton held 6 bottles. How many cartons would they need? How many bottles would be left?

17. Find the cost of 2 neckties at $1.75 each.



Chapter 4

Dividing Tens

1. Mark has 50 pictures to put in his picture album. He will put 5 pictures on each page. How many pages of the album will he use?

To find the answer, divide 50 by 5. 50 is the total number. 5 is the number in each equal group. You are asked to find the number of equal groups.

Divide the tens. 5 tens = 1 ten × 5 ones. Write 1 in tens' place in the quotient.

Multiply. 1 ten × 5 ones = 5 tens.

Bring down the zero. There are *no ones* to divide. That is why you write a zero in the ones' place in the quotient.

```
  10        Check
5)50          10
  5           ×5
  0           50
```

To check, multiply the quotient by the divisor. The product and the dividend should be the same.

2. In this example there are ones in the dividend but not enough to divide. So those ones are the remainder.

In checking, what was done with the remainder?

```
  20 r2       Check
3)62            20
  6             ×3
  2             60
                +2
                62
```

3. Work these examples and check your answers.

$2\overline{)40}$ $2\overline{)61}$ $7\overline{)70}$ $4\overline{)83}$ $2\overline{)60}$ $9\overline{)95}$ $1\overline{)50}$ $3\overline{)62}$

Dividing Tens and Ones

1. Ruth has 3 boxes for the 36 doughnuts she has made. She wants to put an equal number of the doughnuts into each box. How many should she put into a box?

Example A is the example for the problem. Find the answer like this:

Divide tens and *multiply*.
Bring down the ones.
Divide ones and *multiply*.

```
      12
   3)36
A   3
    6
    6
    -
```

The new step in example B is to subtract the ones. The difference is the remainder.

```
      21 r1
   3)64
B   6
    4
    3
    -
    1
```

Find the answers and check your work:

2. $5\overline{)55}$ $2\overline{)46}$ $4\overline{)48}$ $3\overline{)39}$ $1\overline{)75}$ $2\overline{)84}$ $3\overline{)96}$ $4\overline{)88}$

3. $4\overline{)89}$ $3\overline{)35}$ $5\overline{)56}$ $2\overline{)87}$ $7\overline{)79}$ $3\overline{)98}$ $4\overline{)46}$ $2\overline{)69}$

4. Sometimes you will have examples where *tens left* must be changed to ones. Study example C.

In example C divide like this:

Divide tens, *multiply*, *subtract*.
Bring down the ones.
Change tens that are left to ones.
Divide all the ones, *multiply*.

```
      14
   4)56
C   4
   16
   16
   --
```

```
      16 r4
   5)84
D   5
   34
   30
   --
    4
```

In example D you also have to subtract the ones. The difference, 4, is the remainder.

Find the answers for these examples and check your work.

5. $3\overline{)75}$ $2\overline{)30}$ $5\overline{)65}$ $4\overline{)60}$ $6\overline{)78}$ $7\overline{)91}$ $8\overline{)96}$ $7\overline{)98}$

6. $2\overline{)31}$ $3\overline{)77}$ $4\overline{)63}$ $5\overline{)67}$ $6\overline{)79}$ $7\overline{)96}$ $6\overline{)95}$ $4\overline{)59}$

7. $3\overline{)86}$ $2\overline{)53}$ $3\overline{)67}$ $3\overline{)45}$ $4\overline{)97}$ $2\overline{)36}$ $6\overline{)95}$ $5\overline{)76}$

You will remember:

- You divide *tens* in the same way you divide *ones*.

Dividing Money Numbers

1. Ann has \$.48 to spend for candy bars. How many \$.06 candy bars can she buy?

Divide to find the answer. Think of both the divisor and dividend as cents and divide as you would divide other numbers. Like this:

$$\begin{array}{r} 8 \\ 6 \text{ cents}\overline{)48 \text{ cents}} \\ \underline{48} \end{array} \quad = \quad \begin{array}{r} 8 \\ \$.06\overline{)\$.48} \\ \underline{48} \end{array}$$

What is the answer?

2. Bob has \$.25 to spend for \$.08 ice cream cones. How many can he buy and how much change will he get?

Bob can get 3 cones. He will have 1¢ change. Study the example.

$$\begin{array}{r} 3 \text{ r}1¢ \\ \$.08\overline{)\$.25} \\ \underline{24} \\ 1 \end{array}$$

3. Jane has \$.47 to spend on treats for 3 friends. How much can she spend on each treat? How much money will be left?

Study the example for the problem. Can you answer the problem questions?

$$\begin{array}{r} \$.15 \text{ r}2¢ \\ 3\overline{)\$.47} \\ 3 \\ \hline 17 \\ 15 \\ \hline 2 \end{array}$$

Find the answers for the examples below. Use the dollar sign and the cents point correctly. Check each answer.

4. \$.05)\$.45 \$.08)\$.56 \$.06)\$.42 \$.03)\$.26

5. \$.07)\$.50 \$.05)\$.33 \$.02)\$.68 \$.03)\$.93

6. \$.05)\$.59 \$.04)\$.96 \$.05)\$.60 \$.08)\$.99

7. 7)\$.56 9)\$.48 8)\$.75 6)\$.54 9)\$.72

8. 3)\$.96 6)\$.78 5)\$.95 7)\$.85 2)\$.90

Dividing Three-Place Numbers

Study each completed example below. In each example there are not enough hundreds to divide. You will have to change the hundreds to tens and then divide all the tens.

A
$$\begin{array}{r} 80 \\ 5\overline{)400} \\ 40 \\ \hline 0 \end{array}$$

B
$$\begin{array}{r} 80\ r3 \\ 5\overline{)403} \\ 40 \\ \hline 3 \end{array}$$

C
$$\begin{array}{r} 51 \\ 2\overline{)102} \\ 10 \\ \hline 2 \\ 2 \\ \hline \end{array}$$

D
$$\begin{array}{r} 42\ r1 \\ 4\overline{)169} \\ 16 \\ \hline 9 \\ 8 \\ \hline 1 \end{array}$$

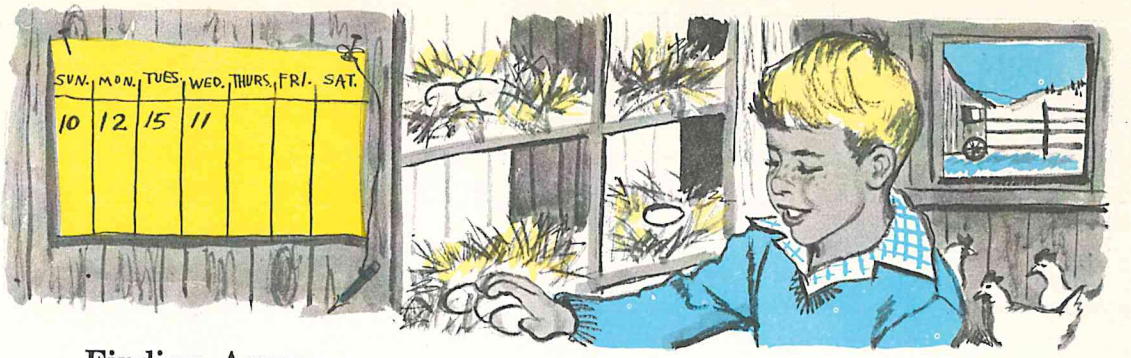
E
$$\begin{array}{r} 76 \\ 8\overline{)608} \\ 56 \\ \hline 48 \\ 48 \\ \hline \end{array}$$

F
$$\begin{array}{r} 67\ r1 \\ 7\overline{)470} \\ 42 \\ \hline 50 \\ 49 \\ \hline 1 \end{array}$$

- In each of the examples A and B you *divide* 40 tens and *multiply*. *Bring down* the ones. There are no ones in A, and not enough ones in B, to divide. Write zero in ones' place in each quotient. The 3 ones left in B are the remainder.
- In example C you *divide* 10 tens and *multiply*. *Bring down* 2 ones. *Divide* the ones and *multiply*.
- In D you *divide* 16 tens and *multiply*. *Bring down* 9 ones. *Divide*, *multiply*, and *subtract*. 1 one left is the remainder.
- In E you *divide* 60 tens, *multiply* and *subtract*. *Bring down* 8. *Change* 4 tens to 40 ones. *Divide* 48 ones and *multiply*.
- In example F *divide* 47 tens, *multiply*, and *subtract*. *Bring down* the zero. *Change* 5 tens to 50 ones. *Divide* 50 ones, *multiply*, and *subtract*. 1 one left is the remainder.

Find and check the answer to each of these examples:

1.	$8\overline{)320}$	$9\overline{)810}$	$7\overline{)490}$	$6\overline{)540}$	$4\overline{)320}$	$2\overline{)101}$	$5\overline{)354}$
2.	$5\overline{)455}$	$3\overline{)186}$	$7\overline{)637}$	$2\overline{)168}$	$4\overline{)368}$	$6\overline{)486}$	$8\overline{)648}$
3.	$3\overline{)217}$	$5\overline{)206}$	$8\overline{)569}$	$7\overline{)288}$	$6\overline{)547}$	$4\overline{)329}$	$2\overline{)185}$
4.	$4\overline{)336}$	$2\overline{)108}$	$2\overline{)114}$	$6\overline{)492}$	$5\overline{)340}$	$8\overline{)520}$	$7\overline{)651}$
5.	$3\overline{)236}$	$7\overline{)605}$	$4\overline{)382}$	$8\overline{)499}$	$6\overline{)578}$	$5\overline{)447}$	$9\overline{)659}$



Finding Averages

1. Jack is keeping a record of the eggs he collects each day. His record for 4 days is shown in the chart above. On the average, how many eggs does Jack collect each day?

This is a *two-step* problem.

Step 1. Add to find the number of eggs Jack got in all. $10 + 12 + 15 + 11 = 48$.

Step 2. Divide the number of eggs by the number of addends. There are 4 addends. $48 \div 4 = 12$.

The *average* number of eggs collected per day is 12. If Jack had collected 12 eggs each day, the total would also have been 48.

Sometimes the problem gives us the sum of the addends and tells us the number of addends. This is a *one-step* problem. Study problem 2 below.

$$\begin{array}{r} 10 \\ 12 \\ 15 \\ +11 \\ \hline 48 \end{array}$$

$$\begin{array}{r} 12 \\ 4\overline{)48} \\ 4 \\ \hline 8 \\ 8 \\ \hline \end{array}$$

2. Mary gained 33 pounds in 3 years. What was the average gain per year?

The sum of the addends is 33 and the number of addends is 3. Find the average. $33 \div 3 = ?$

3. The Johnsons used 180 quarts of milk in 4 weeks. What was the average number of quarts used per week?

You will remember:

- To find the *average* of several numbers, *add* the numbers and *divide* the sum by the number of addends.
- When the sum of the addends is given, divide it by the number of addends.

Should You Add, Subtract, Multiply, or Divide?

You know that how you solve an arithmetic problem depends upon what the question in the problem means.

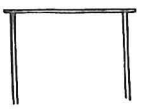
If the question means:	*Then do this:*
> Find how many in all	Add
> Find the difference between two numbers	Subtract
> Find how many in all of the equal groups	Multiply
> Find how many equal groups > Find how many in each equal group	Divide

Below are problems without numbers. Read each problem. Decide whether you would add, subtract, multiply, or divide to find the answer. Be ready to tell why you decided as you did.

1. You know how much money you have and how much you must spend for a football. How can you *find how much money will be left?*

2. You know the cost of a can of peas and how many cans you must buy. How can you *find the total cost?*

3. You know how many fudge squares the children made and how many they will put on each plate. How can you *find how many plates they will need?*



4. You know how much money you spent for each of several different items. How can you *find the total amount* spent?

5. You know the number of examples you got right in each of three tests. How can you *find the average* number you got right per test?

6. You know how much money you earned in 5 days. How would you *find the average* amount earned per day?

7. You know how much a bicycle costs and how much money you have saved. How can you *find how much more money you need* in order to buy the bicycle?

8. You know how many marbles you had yesterday and how many you have now. How can you find *how many* marbles *are gone?*

Dividing Hundreds and Ones

1. An airplane made a flight of 804 miles in 4 hours. What was its average speed per hour?

Divide hundreds and *multiply* as shown.
Bring down tens. There are no tens to divide so write 0 in tens' place in the quotient.
Bring down ones as shown.
Divide ones and *multiply* as shown.

$$\begin{array}{r} 201 \\ 4\overline{)804} \\ 8 \\ \hline 04 \\ 4 \\ \hline \end{array}$$

What is the answer to the problem question?

2. Study each completed example and the directions below.

A $\begin{array}{r} 200 \\ 3\overline{)600} \\ 6 \\ \hline 00 \end{array}$ B $\begin{array}{r} 200\ r2 \\ 3\overline{)602} \\ 6 \\ \hline 02 \end{array}$ C $\begin{array}{r} 201\ r3 \\ 4\overline{)807} \\ 8 \\ \hline 07 \\ 4 \\ \hline 3 \end{array}$ D $\begin{array}{r} 109 \\ 9\overline{)981} \\ 9 \\ \hline 81 \\ 81 \\ \hline \end{array}$ E $\begin{array}{r} 309\ r1 \\ 2\overline{)619} \\ 6 \\ \hline 19 \\ 18 \\ \hline 1 \end{array}$

- In examples A and B divide hundreds. There are no tens and no ones, or, in B, not enough ones to divide.
- Example C is like the example for problem 1 except that there is a remainder.
- In D and E, you have to change tens that are left to ones and divide all the ones. In E there is a remainder.

Find and check the answers for the examples below.

3. $4\overline{)800}$ $3\overline{)900}$ $2\overline{)400}$ $5\overline{)500}$ $4\overline{)803}$ $6\overline{)605}$ $2\overline{)801}$

4. $3\overline{)603}$ $2\overline{)608}$ $4\overline{)808}$ $9\overline{)909}$ $4\overline{)409}$ $6\overline{)608}$ $3\overline{)907}$

5. $3\overline{)315}$ $8\overline{)856}$ $9\overline{)963}$ $6\overline{)630}$ $4\overline{)828}$ $7\overline{)742}$ $2\overline{)418}$

6. $9\overline{)947}$ $7\overline{)759}$ $4\overline{)822}$ $9\overline{)969}$ $8\overline{)875}$ $7\overline{)765}$ $4\overline{)830}$

You will remember:

- Divide *hundreds* the same way you divide *tens* or *ones*.

Solving Problems

Read each problem carefully to find what it tells and what question it asks. Decide whether to add, subtract, multiply, or divide to find the answer. Write A, S, M, or D. Then solve the problem.

1. Roy kept a weather calendar for 31 days in October. All but 17 days were sunny. How many days were sunny?

2. Mr. Johnson has to make a 205-mile trip in 5 hours. What is the average number of miles he should drive per hour?

3. Four girls have bought 10-cent savings stamps as follows: Nancy, 89; Alice, 110; Judy, 78; Betty, 109. How many stamps have the girls bought in all?

4. If the girls put 24 cookies on each tray, how many cookies will they put on 8 trays?

5. Jack weighs 105 pounds now. Last spring he weighed 96 pounds. How many pounds has he gained?

6. Three boys plan to sell a total of 75 tickets for the school play. If they divide the tickets equally, how many will each boy have to sell?

7. The enrollment in a school was 77 in kindergarten, 32 in first grade, 29 in second grade, 31 in third grade, 28 in fourth grade, 29 in fifth grade, and 23 in sixth grade. What was the total enrollment?

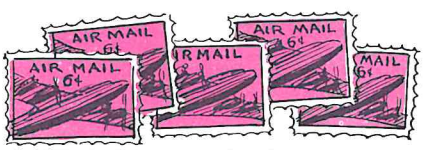
8. How many 5-pound bags of flour can a grocer fill from a large bag of flour with a net weight of 98 pounds, and how many pounds will he have left?

9. Janet practiced piano lessons for 25 minutes each day for 6 days. How many minutes did she practice in all?

10. Jane had $2.50 and spent $1.79. How much money did she have left?

11. How many 6¢ stamps can you buy for $.90?

12. Mr. Brock drove 840 miles in 4 days. What was the average number of miles he drove per day?



Dividing Hundreds, Tens and Ones

1. Study each completed example below. Use the directions.

● In examples A and B, *divide* hundreds and *multiply*. *Bring down* tens. *Divide* tens and *multiply*. *Bring down* ones. There are no ones, or not enough ones to divide, so write 0 in ones' place in the quotient. The 1 one in B is the remainder.

A
$$\begin{array}{r} 230 \\ 3\overline{)690} \\ 6 \\ \hline 9 \\ 9 \\ \hline 0 \end{array}$$

B
$$\begin{array}{r} 230\ \text{r1} \\ 3\overline{)691} \\ 6 \\ \hline 9 \\ 9 \\ \hline 1 \end{array}$$

C
$$\begin{array}{r} 423 \\ 2\overline{)846} \\ 8 \\ \hline 4 \\ 4 \\ \hline 6 \\ 6 \\ \hline \end{array}$$

D
$$\begin{array}{r} 423\ \text{r1} \\ 2\overline{)847} \\ 8 \\ \hline 4 \\ 4 \\ \hline 7 \\ 6 \\ \hline 1 \end{array}$$

E
$$\begin{array}{r} 329 \\ 3\overline{)987} \\ 9 \\ \hline 8 \\ 6 \\ \hline 27 \\ 27 \\ \hline \end{array}$$

F
$$\begin{array}{r} 329\ \text{r2} \\ 3\overline{)989} \\ 9 \\ \hline 8 \\ 6 \\ \hline 29 \\ 27 \\ \hline 2 \end{array}$$

● In example C *divide* hundreds and *multiply*. *Bring down* tens. *Divide* tens and *multiply*. *Bring down* ones. *Divide* ones and *multiply*.

● The new step in example D is to subtract the ones.

● In E you must subtract tens, change the tens that are left to ones, and divide all the ones.

● Example F is like example E except that you must also subtract the ones. So you have a remainder in F.

Divide and check:

2. $2\overline{)460}$ $4\overline{)880}$ $3\overline{)930}$ $4\overline{)480}$ $5\overline{)554}$ $2\overline{)861}$ $7\overline{)775}$

3. $9\overline{)999}$ $3\overline{)963}$ $2\overline{)642}$ $7\overline{)777}$ $4\overline{)488}$ $2\overline{)468}$ $3\overline{)669}$

4. $2\overline{)487}$ $5\overline{)559}$ $3\overline{)638}$ $8\overline{)889}$ $2\overline{)863}$ $3\overline{)968}$ $4\overline{)849}$

5. $3\overline{)642}$ $4\overline{)460}$ $2\overline{)678}$ $8\overline{)896}$ $3\overline{)981}$ $2\overline{)474}$ $5\overline{)565}$

6. $2\overline{)643}$ $6\overline{)679}$ $2\overline{)637}$ $3\overline{)979}$ $7\overline{)792}$ $4\overline{)870}$ $8\overline{)898}$

7. $6\overline{)686}$ $4\overline{)844}$ $3\overline{)391}$ $4\overline{)840}$ $2\overline{)497}$ $5\overline{)575}$ $4\overline{)489}$

Dividing Dollars and Cents

1. The refreshment stand at the park sold \$6.08 worth of ice cream cones at \$.08 each. How many cones were sold?

To find the answer you divide \$6.08 by \$.08.

Think of the dollars, dimes, and cents as cents. Then divide as with ordinary numbers. The answer to the question is 76 cones. This means that \$6.08 equals 76 groups of \$.08 each.

$$\begin{array}{r} 76 \\ 8\text{¢}\overline{)608\text{¢}} \\ 56 \\ \hline 48 \\ 48 \\ \hline \end{array} \quad = \quad \begin{array}{r} 76 \\ \$.08\overline{)\$6.08} \\ 56 \\ \hline 48 \\ 48 \\ \hline \end{array}$$

Find the answers for these division examples:

2. \$.06)\$2.46	\$.04)\$3.68	\$.05)\$4.35	\$.07)\$5.15
3. \$.04)\$4.84	\$.03)\$9.37	\$.02)\$6.38	\$.05)\$5.69
4. \$.03)\$8.15	\$.06)\$7.89	\$.04)\$9.92	\$.07)\$8.74

Study the completed example below. \$8.39 divided into 5 equal groups equals \$1.67 in each group and 4¢ left.

$$\begin{array}{r} \$1.67 \text{ r}4\text{¢} \\ 5\overline{)\$8.39} \\ 5 \\ \hline 33 \\ 30 \\ \hline 39 \\ 35 \\ \hline 4 \end{array}$$

Find the answers. Check your work.

5. 4)\$1.68	6)\$4.26	8)\$4.09	2)\$1.98
6. 9)\$5.94	6)\$5.75	8)\$7.60	4)\$3.00
7. 5)\$5.58	2)\$6.84	3)\$6.39	7)\$7.98
8. 6)\$6.84	3)\$9.79	2)\$3.10	8)\$9.84
9. 7)\$8.99	3)\$5.85	4)\$6.80	5)\$7.93

You will remember:

- When you divide a money number by a money number, the quotient is an ordinary number.
- When you divide a money number by an ordinary number, the quotient is a money number.

Changing Hundreds Left to Tens

In each example below there are hundreds left after you divide the hundreds. You must change these hundreds to tens and then divide all the tens. Study the examples below.

A
$$\begin{array}{r} 160 \\ 4\overline{)640} \\ 4 \\ \hline 24 \\ 24 \\ \hline 0 \end{array}$$

B
$$\begin{array}{r} 160\ r3 \\ 4\overline{)643} \\ 4 \\ \hline 24 \\ 24 \\ \hline 3 \end{array}$$

C
$$\begin{array}{r} 252 \\ 3\overline{)756} \\ 6 \\ \hline 15 \\ 15 \\ \hline 6 \\ 6 \\ \hline \end{array}$$

D
$$\begin{array}{r} 252\ r1 \\ 3\overline{)757} \\ 6 \\ \hline 15 \\ 15 \\ \hline 7 \\ 6 \\ \hline 1 \end{array}$$

E
$$\begin{array}{r} 136 \\ 6\overline{)816} \\ 6 \\ \hline 21 \\ 18 \\ \hline 36 \\ 36 \\ \hline \end{array}$$

F
$$\begin{array}{r} 136\ r3 \\ 6\overline{)819} \\ 6 \\ \hline 21 \\ 18 \\ \hline 39 \\ 36 \\ \hline 3 \end{array}$$

- In examples A and B *divide* hundreds, *multiply* and *subtract. Bring down* tens. *Change* hundreds left to tens. *Divide* all the tens and *multiply*. *Bring down* ones. There are no ones, or not enough to divide.
- In C and D there are enough ones to divide.
- In E and F you also change tens left to ones.
- Why are there remainders in examples B, D, and F?

Divide. Check your answers.

1. $3\overline{)420}$ $2\overline{)700}$ $6\overline{)780}$ $7\overline{)910}$ $5\overline{)850}$ $4\overline{)760}$ $8\overline{)960}$

2. $5\overline{)654}$ $4\overline{)563}$ $3\overline{)842}$ $6\overline{)905}$ $7\overline{)846}$ $2\overline{)981}$ $5\overline{)703}$

3. $7\overline{)987}$ $5\overline{)805}$ $8\overline{)968}$ $4\overline{)768}$ $6\overline{)846}$ $3\overline{)489}$ $2\overline{)566}$

4. $5\overline{)759}$ $6\overline{)908}$ $7\overline{)919}$ $2\overline{)967}$ $3\overline{)548}$ $4\overline{)609}$ $6\overline{)849}$

5. $2\overline{)510}$ $4\overline{)652}$ $6\overline{)936}$ $8\overline{)992}$ $3\overline{)768}$ $7\overline{)994}$ $5\overline{)670}$

6. $3\overline{)503}$ $5\overline{)784}$ $7\overline{)975}$ $2\overline{)597}$ $4\overline{)610}$ $3\overline{)791}$ $5\overline{)928}$

7. $\$.03\overline{)\$1.77}$ $\$.05\overline{)\$2.70}$ $\$.03\overline{)\$6.37}$ $\$.05\overline{)\$4.45}$

8. $9\overline{)\$3.69}$ $6\overline{)\$7.89}$ $4\overline{)\$9.92}$ $7\overline{)\$8.74}$ $8\overline{)\$9.96}$

Problems to Solve

Read each problem carefully to find what it tells you and what question it asks. Decide how to solve the problem. Write A for add, S for subtract, M for multiply, D for divide. Then find the answer.

1. Ruth, Ann, and Jack had charge of selling tickets for a school play. Ruth's team sold 107 tickets, Ann's team sold 96 tickets, and Jack's team sold 143 tickets. How many tickets did the three teams sell?

2. How many more tickets did Jack's team sell than Ann's?

3. How many fewer tickets did Ann's team sell than Ruth's?

4. Judy's club sold 23 tickets on Monday, 17 tickets on Tuesday, and 19 tickets on Wednesday. How many tickets did the club sell on these three days?

5. Betty's mother said that each gallon of lemonade would fill 16 glasses. If the children make 4 gallons of lemonade for a party, how many glasses of lemonade will they have?

6. Robert and 3 of his friends went to a camp together. They agreed to share the expenses of the trip equally. If the cost was $7.28, what was each boy's share?

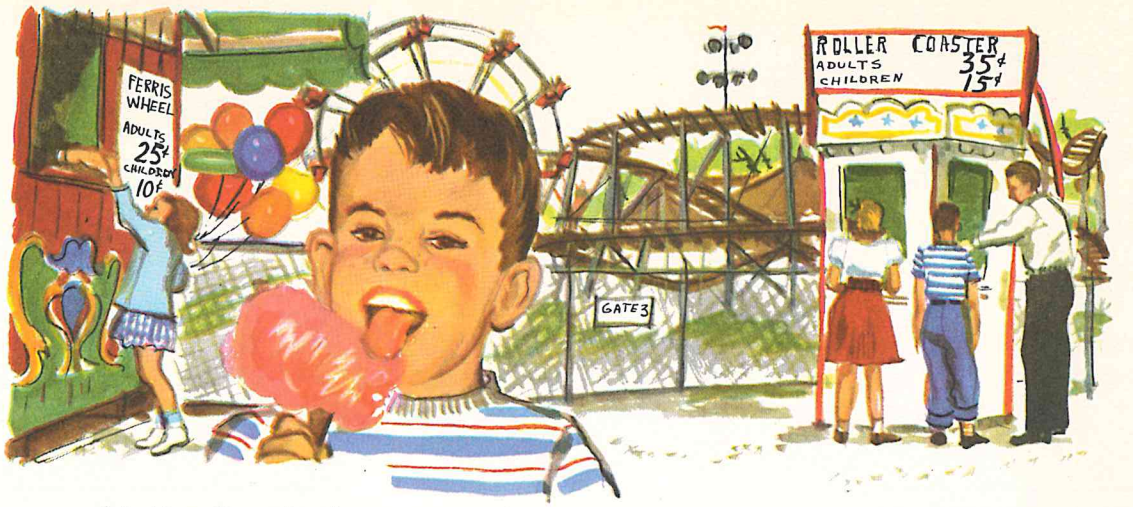
7. Susan's mother bought 2 dresses that cost $4.65 each. What was the total cost?

8. A basketball priced at $5.79 was reduced to $4.85 for a special sale. The special price was how much less than the regular price?

9. Tom wants to give each child 3 sheets of drawing paper. The paper is in packages of 24 sheets. How many children will get paper from each package?

10. Julie spent 14¢ on Monday, 10¢ on Tuesday, 15¢ on Wednesday, and 13¢ on Thursday. What was the average amount spent per day?

11. At an average speed of 575 miles per hour, how far would a jet plane fly in 3 hours?



At the Carnival

1. Bob rode on the ferris wheel and the roller coaster and bought some candy snow for 10¢. How much did he spend?

2. Ray bought a ticket for the roller coaster and gave the man a dollar. How much change should Ray get?

3. Dick's father bought roller-coaster tickets for 6 children. How much did he spend?

4. Jane's mother bought tickets for the roller coaster for Jane, Betty, and herself. How much did she have to pay?

5. Harry had 40¢. He spent it for rides that cost 5¢ each. How many rides did he take?

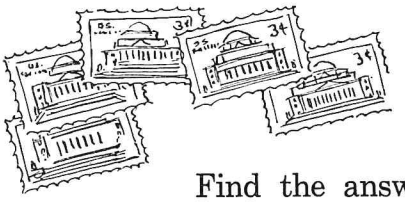
6. Tom counted 9 adults waiting in line in front of him at the roller-coaster window. If each of the adults bought a ticket, how much did they spend altogether?

7. The man who sells ice cream bars has taken in $7.15 today. At 5¢ each, how many ice cream bars has he sold?

8. Ben's father paid $4.05 for 3 lunches. If the lunches cost the same amount, what was the cost of each lunch?

9. The merry-go-round goes around 240 times in one hour. How many times will it go around in $\frac{1}{2}$ hour?

10. The man who sold candied apples said that he had taken in $5.28 during the day. If candied apples cost $.06 apiece, how many had he sold?



Review and Practice

Find the answer for each example and problem on this page. Check your answers.

Add:

1.

59	86	47	48	35	244	31	94	$1.42
76	57	52	80	76	56	426	83	3.61
68	48	54	62	94	782	752	19	.87
29	97	58	64	97	93	87	85	7.79
96	39	69	99	72	14	945	77	.93

Subtract:

2.

98	58	23	565	450	723	506	$4.02
8	46	16	60	35	449	287	3.28

Multiply:

3.

63	18	82	49	219	225	476	$6.29	$3.53
2	3	7	2	5	8	5	3	7

Divide:

4. $3\overline{)90}$ $2\overline{)64}$ $8\overline{)89}$ $4\overline{)288}$ $7\overline{)705}$ $6\overline{)624}$ $5\overline{)548}$

5. $3\overline{)960}$ $2\overline{)648}$ $3\overline{)945}$ $8\overline{)960}$ $7\overline{)847}$ $3\overline{)875}$ $5\overline{)687}$

Find the missing numbers:

6. $\frac{1}{3}$ of 15 = ? $\frac{2}{3}$ of 18 = ? $\frac{3}{4}$ of 36 = ? $\frac{1}{5}$ of 40 = ?

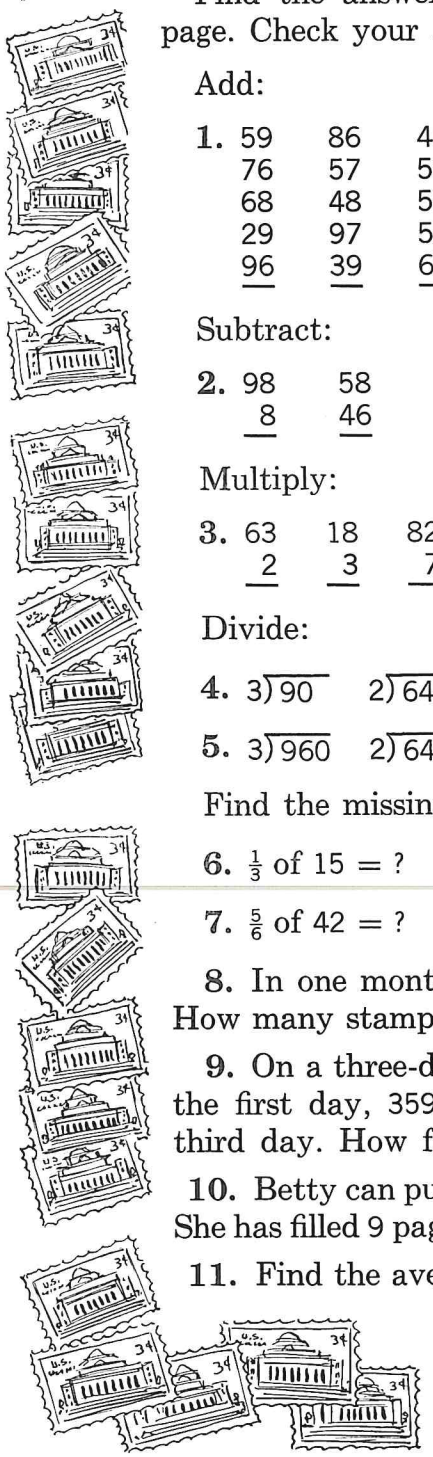
7. $\frac{5}{6}$ of 42 = ? $\frac{1}{8}$ of 64 = ? $\frac{3}{8}$ of 64 = ? $\frac{3}{5}$ of 20 = ?

8. In one month, Jane's father spent $3.18 for 3¢ stamps. How many stamps did he buy?

9. On a three-day trip Jack and his father drove 309 miles the first day, 359 miles the second day, and 420 miles the third day. How far did they drive altogether?

10. Betty can put 64 stamps on each page of her stamp book. She has filled 9 pages. How many stamps are there in the book?

11. Find the average of 25, 63, 47, 18, and 28.



To Help You Remember

The page numbers after the questions tell you where to turn for help if you need it.

▶ *To think and talk about:*

1. Explain the steps you would use in solving a problem. (12, 54, 60)

2. Explain how you would check the answer to an addition example. (10) A subtraction example. (21) A multiplication example. (35) A division example. (49)

3. What do you do with what is left in an uneven division example? (42)

4. Explain to the class how you would divide 717 by 5. (59)

5. Explain how you would divide \$1.25 by \$.05 and \$1.25 by 5. (58)

6. How can you find the average of several numbers? (53)

7. Explain how you would find $\frac{2}{5}$ of 15. (45)

▶ *To think about and write:*

1. Solve this problem. (52-53)

Mr. Harris plans to make a 246-mile trip in 6 hours. How many miles does he expect to make per hour?

Find the answer for each example. Check each answer.

2.
$$\begin{array}{r} 435 \\ 124 \\ +876 \end{array}$$ (13)

3.
$$\begin{array}{r} 327 \\ -165 \end{array}$$ (22)

4.
$$\begin{array}{r} 365 \\ \times 7 \end{array}$$ (36)

5. $3\overline{)73}$ (49-50)

6.
$$\begin{array}{r} \$3.25 \\ .96 \\ 6.67 \\ +1.00 \end{array}$$ (13)

7.
$$\begin{array}{r} 935 \\ 80 \\ 6 \\ +25 \end{array}$$ (13)

8. $2\overline{)206}$ (55)

9. $3\overline{)478}$ (59)

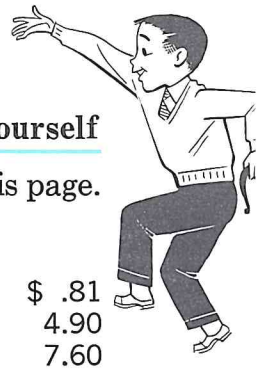
10. $3\overline{)516}$ (59)

11. $5\overline{)687}$ (59)

12. Find the average of 18, 27, 16, 23. (53)

13. Find the following fractional parts. (43-45)

$\frac{7}{8}$ of 64¢ = ?¢. $\frac{4}{5}$ of 45¢ = ?¢. $\frac{5}{6}$ of 18 books = ? books.



Testing Yourself

Find the answer for each example and problem on this page.

Add:

1.

39	12	30	42	62	421	27	484	\$ .81
24	37	23	19	20	61	67	273	4.90
67	15	10	24	73	365	82	649	7.60
42	13	24	11	82	17	53	562	.08
35	21	11	76	91	826	19	205	9.30

Subtract:

2.

38	46	56	174	650	486	804	\$9.55
6	19	29	52	78	138	359	4.62

Multiply:

3.

51	27	62	538	327	417	\$8.55	\$4.05
9	2	6	9	8	5	6	7

Divide:

4. $4\overline{)83}$ $5\overline{)75}$ $3\overline{)56}$ $3\overline{)121}$ $8\overline{)569}$ $4\overline{)408}$ $3\overline{)908}$

5. $5\overline{)553}$ $4\overline{)849}$ $8\overline{)898}$ $6\overline{)783}$ $4\overline{)716}$ $7\overline{)940}$ $6\overline{)832}$

Find the missing numbers:

6. $\frac{1}{2}$ of 18 = ? $\frac{2}{3}$ of 27 = ? $\frac{1}{4}$ of 36 = ? $\frac{3}{4}$ of 32 = ?

7. $\frac{3}{5}$ of 25 = ? $\frac{1}{6}$ of 54 = ? $\frac{1}{8}$ of 56 = ? $\frac{5}{8}$ of 56 = ?

8. At the store Billy paid 79¢ for a book. He gave the clerk \$1.00. How much change did he get?

9. Walter had \$2.85. He earned 45¢ on Friday and 70¢ on Saturday. How much money did he have in all?

10. If 3 boys buy a football for \$3.90 and share the cost equally, how much should each boy pay?

11. Jim says he can make 3 posters from each sheet of cardboard. How many sheets will he use for 24 posters?

Chapter 5

A Scout Rally

1. All the Boy Scout troops and the Cub Scout packs in Tomahawk held a rally. There were 265 Boy Scouts and 89 Cub Scouts present. How many scouts in all were present?

2. How many more Boy Scouts than Cub Scouts were present at the rally?

3. The scouts reported that they had had three paper drives during the year. They earned $50 on the first drive, $40 on the second drive, and $45 on the third drive. How much did they earn on all three paper drives?

4. At lunch each boy had 2 sandwiches. How many sandwiches did all the boys have?

5. They had pie for dessert. If 6 scouts were served from each pie, how many pies were used to serve all the boys?

6. Tom and his brother Charles were new members of Scout Troop 1 and had just bought their uniforms. If the price of each uniform was $8.60, how much did the 2 uniforms cost?

7. James said that his troop had $9.15 in its treasury. If $7.20 is spent for equipment to use on a hike, how much money will there be left in the treasury?

Understanding Roman Numbers

The Roman number in the picture on page 67 tells the year in which the building was built. It was built in 1953.

The Romans used seven letters, or numerals, to write their numbers. The numerals and their value, are shown below.

1	5	10	50	100	500	1000
I	V	X	L	C	D	M

The following chart shows the difference between Roman numbers and the Arabic numbers used in our Decimal System.

Ones:	I	II	III	IV	V	VI	VII	VIII	IX
	1	2	3	4	5	6	7	8	9
Tens:	X	XX	XXX	XL	L	LX	LXX	LXXX	XC
	10	20	30	40	50	60	70	80	90
Hun-	C	CC	CCC	CD	D	DC	DCC	DCCC	CM
dreds:	100	200	300	400	500	600	700	800	900

1. In which Roman numbers do you see the same numerals used more than once? Numerals that are repeated are added. III means 1 + 1 + 1 = 3. What does XXX mean? CCC = ?

2. In which Roman numbers is a smaller numeral written before a larger numeral? Do you see that these smaller numerals are subtracted? IV means 5 − 1 = 4. What does IX mean? What does XL mean? What does XC mean? CD? CM?

3. In which Roman numbers is a smaller numeral written after a larger numeral? Do you see that these smaller numerals are added? VII means 5 + 1 + 1 = 7. What does LXXX mean? What does DCC mean?

4. The numerals V, L, and D are never repeated in a number. What numeral takes the place of two V's? What numeral takes the place of two L's? of two D's?

Reading and Writing Roman Numbers

Study the charts on page 66 and write these numbers using Roman numerals:

1. The numbers from 10 through 19.

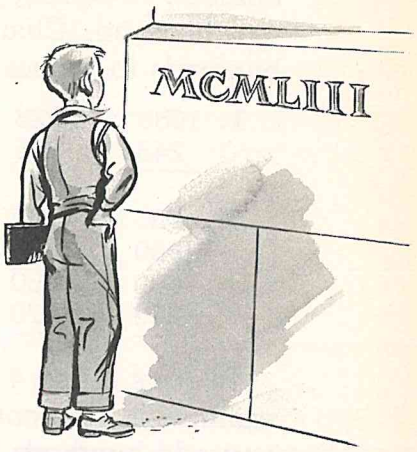
2. The numbers from 40 through 49.

3. The numbers from 70 through 80.

4. The numbers by fives from 5 through 100.

5. The numbers by tens from 900 through 1000.

6. The numbers from 897 through 906.



Write the numbers in rows 7, 8, 9, and 10 as Roman numbers.

7.	3	6	15	17	19	22	24	28
8.	32	35	39	51	53	56	60	67
9.	69	81	84	88	90	92	96	99
10.	105	210	307	415	530	606	709	850

Write these Roman numbers as decimal numbers.

11.	II	VII	XVI	XIX	XXIV	XXVII
12.	XXI	XX	XXX	LII	XLIV	LXIII
13.	LV	LXX	XCV	LIX	LXXXI	XXXIII

14. Find a book in which Roman numbers are used to number the chapters. Practice reading the table of contents in such a book.

15. Perhaps you can find a building or a monument in your neighborhood on which a Roman number is used to show the date it was built. Copy the number and explain its meaning to the class.

Addition with Four-Place Numbers

In each example in rows 1 and 2, one addend is a four-place number. In adding you may need to change 10 thousands to 1 ten-thousand. Change ones to tens, tens to hundreds, and hundreds to thousands when necessary. Add, and check:

1.	1635	9523	7591	957	548	635	9689
	243	715	682	5864	9548	2045	975
2.	700	180	2569	980	700	165	706
	3500	360	450	8963	405	4032	340
	600	250	678	692	506	280	208
	300	2470	770	750	1203	309	9050

In rows 3 and 4 all addends are four-place numbers. Each example is different. You add the thousands in the same way you add hundreds, tens, or ones. Copy, add, and check:

3.	3890	1234	8356	2143	3918	4256	2798	7860
	5639	9812	4173	5607	4342	3744	4236	6957
4.	1023	8207	6000	3724	1245	3405	5132	3070
	2001	7036	2123	1000	2090	5006	4273	7329
	3450	6005	4500	1800	1360	8900	9000	2343
	2315	5124	1034	2031	3002	4302	2095	3503

Solve these problems:

5. Steve's father sold two steers and a calf. Their weights were 1267 pounds, 1120 pounds, and 429 pounds. What was the total weight of the three animals?

6. At the market Steve saw two truck loads of cattle being weighed. One weighed 9875 pounds and the other weighed 8967 pounds. How much did both loads weigh?

7. On the way home Steve's father bought a rug for $68.55 and a chair for $35.85. How much did he pay for both?

You will remember:

- You add *thousands* in the same way that you add *hundreds*, *tens*, or *ones*.

Problems to Solve

For each problem write A, S, M, or D. Then find the answer.

1. Bob had 265 stamps and bought 75 more. How many stamps did he then have in all?

2. Ticket sales for four home games at the baseball park were as follows: 2376, 1912, 1987, and 2128. What was the total number of tickets sold for those four games?

3. A grocer paid \$2.04 for empty bottles at the rate of 2¢ each. How many bottles should he have received?

4. John wants to buy a model airplane kit that is priced at \$5.00. He has \$3.98. How much more money does he need?

5. Bob's father used 8 gallons of gasoline for a 144-mile trip. How many miles did he get per gallon?

6. Martha bought 8 boxes of berries for her mother. They cost 39¢ a box. What was the total cost?

7. Betty's mother wants to buy a bracelet for \$10.98 plus tax of \$2.19. What is the total cost?

8. John had \$14.98 in his savings bank. He saved \$2.25 in October and \$1.75 in November. What were his total savings?

9. Four loads of coal weighed 3785 lb., 3950 lb., 4119 lb., and 3985 lb. What was their total weight?

10. Jane had \$5.00 and spent \$.89 for a book. How much money did she have left?

Subtracting Three-Place from Four-Place Numbers

1. Ann and her mother started on a 2875-mile trip to San Francisco. They drove 465 miles the first day. How many miles did they still have to drive?

Subtract the ones, tens, and hundreds and bring down the thousands.

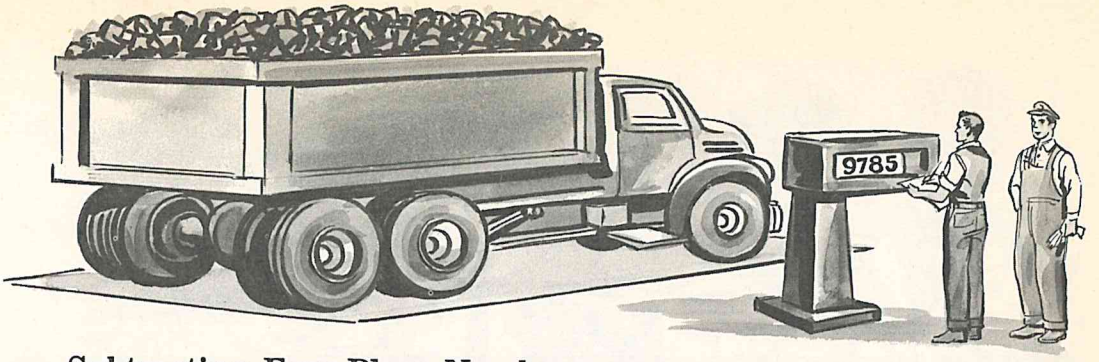
They still had 2410 miles to drive.

$$\begin{array}{r} 2875 \\ -465 \\ \hline 2410 \end{array}$$

All of the examples on this page have four-place minuends. To find some of the answers you will have to change thousands to hundreds. You may have to change hundreds to tens and tens to ones. Be sure to bring down the thousands or the thousands left. Copy and subtract. Check each answer.

2.	5367 254	3695 103	9850 400	6738 905	3400 500	5346 712	6070 830
3.	4754 570	7060 890	2579 189	8236 570	6549 895	3428 648	1357 985
4.	5008 245	2003 670	7009 892	1861 648	5980 723	7684 536	3298 159
5.	1792 963	4265 318	2254 706	6071 135	2841 678	7930 433	8753 695
6.	2841 853	7651 964	2465 789	6064 785	9016 377	4046 548	8068 489
7.	2704 565	3506 457	2708 329	8906 647	5602 275	6805 198	4903 836
8.	2304 586	6203 777	8407 428	3605 839	7502 914	5101 642	9706 859
9.	6000 835	5005 976	3007 948	4004 465	1000 127	2005 296	8000 384

10. $5273 - 476 = ?$ $\quad 1034 - 265 = ?$ $\quad 4683 - 706 = ?$



Subtracting Four-Place Numbers

1. The loaded truck weighs 9785 pounds. When it is empty, the truck weighs 6285 pounds. How many pounds of coal are on the truck?

You subtract to answer the question. Subtract the ones, the tens, the hundreds, and then the thousands. The truck holds 3500 pounds of coal.

$$\begin{array}{r} 9785 \\ -6285 \\ \hline 3500 \end{array}$$

In all the examples on this page, the minuends and subtrahends are four-place numbers.

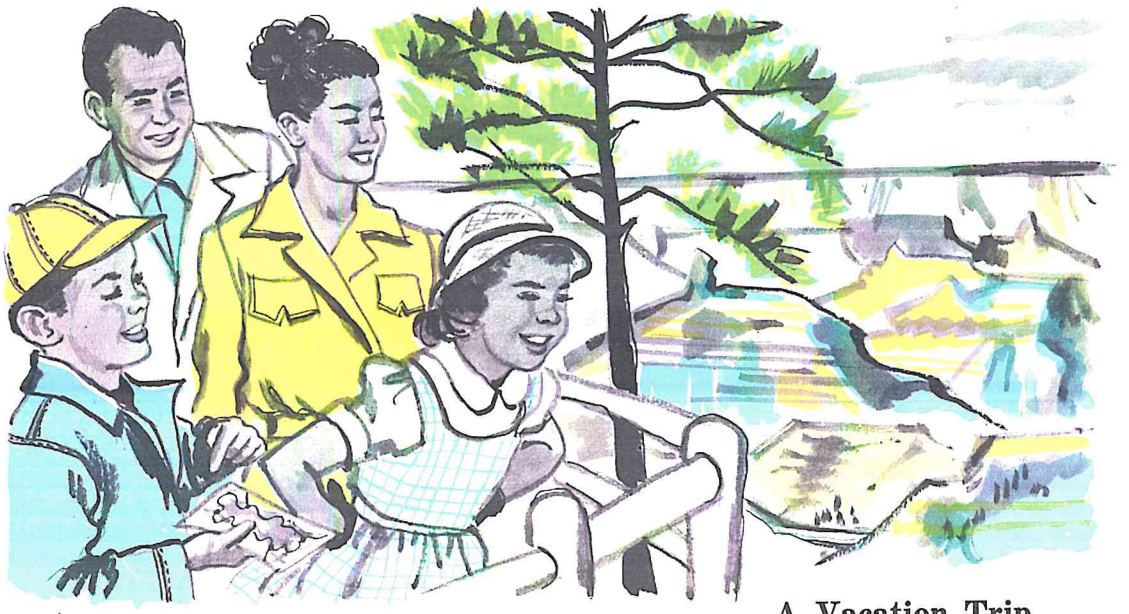
Thousands are subtracted in the same way as hundreds, tens, or ones. Change tens to ones, hundreds to tens, or thousands to hundreds when you need to do so.

Write the answers on folded paper placed below each row:

2.	6478	2798	9680	7920	6479	9128	3240
	2366	1824	4900	6430	6389	5436	2570
3.	5009	9006	5485	8677	1986	6592	8457
	1349	4321	3248	5619	1937	1847	2619
4.	5637	2745	8376	7653	6053	4047	7011
	2569	1378	5697	3879	3694	2468	6357
5.	3502	8905	9802	2703	7304	9502	5436
	2468	3529	3564	1856	1679	3645	3479
6.	8005	7000	6008	3001	5000	9004	4002
	4726	3415	2999	2123	1567	5248	1684

You will remember:

- You subtract *thousands* in the same way that you subtract *hundreds*, *tens*, or *ones*.



A Vacation Trip

Jack kept a record of the expenses on a vacation trip that he and his family took last summer. His record was as follows:

Expense Record

	Meals	Gas	Oil	Lodging
Sunday	$7.75	$5.85	$.40	$8.50
Monday	$8.20	$6.12	. . .	$6.00
Tuesday	$7.25	$5.65	$.80	$7.50
Wednesday	$6.90	$6.29	. . .	$8.00
Thursday	$3.50	$2.75	$.40	. . .

Answer these questions about the expense record:

1. What were the total expenses for each day?
2. How much was spent for meals?
3. What did the gas cost for the entire trip?
4. How much was spent for oil?
5. What were the total expenses for lodging?
6. At the end of the trip Jack's father had the oil changed and the car greased. The oil change cost $2.40 and the greasing cost $1.75. What was the total cost?

Solving Two-Step Problems

In the first step of a two-step problem, you must find a number not given in the problem. You then use that number in the second step to find the answer for the problem question. Find the answer for each problem below.

1. Betty earned \$.75 on Friday and \$.90 on Saturday. On Sunday she spent \$.39. How much money did she have left?

Step 1	Step 2
\$ .75	\$1.65
+.90	−.39
\$1.65	\$1.26

Step 1. Add the amounts that Betty had earned. Why?

Step 2. Subtract what she spent from what she had earned. Why?

2. John and George had 175 papers to deliver. John delivered 73 and George delivered 79. How many more did they have to deliver?

3. Jane made 25 party favors and Sally made 29. They need 70. How many more must they make?

4. Judy had \$3.25 and earned \$.25 for an errand. Then she spent \$.89 for a book. How much money did she have left?

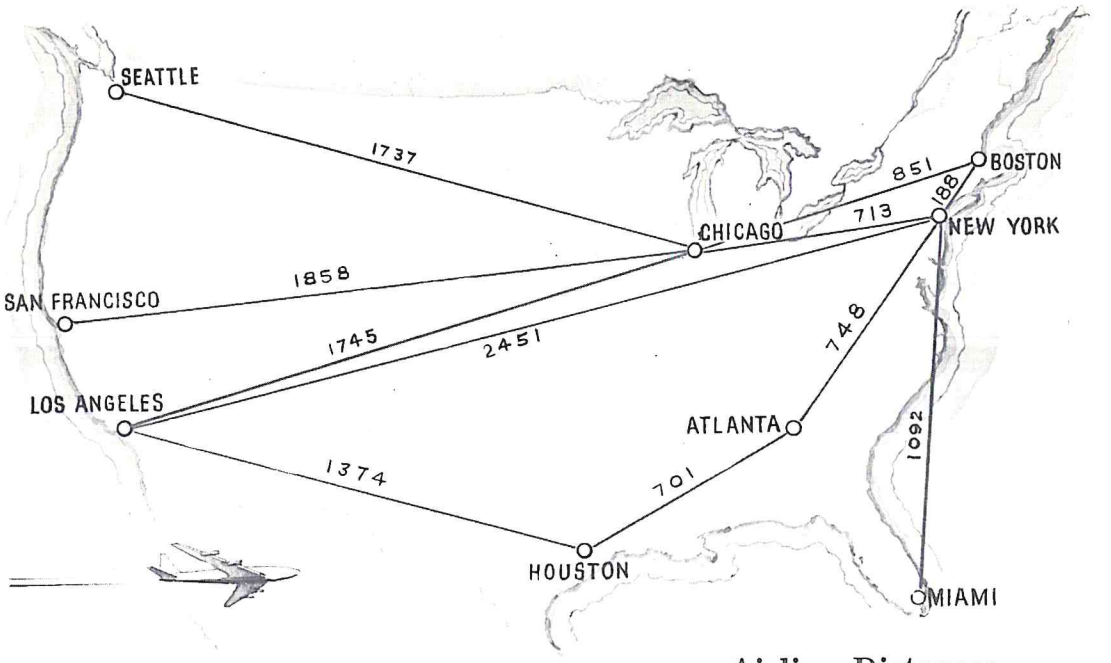
5. Virgil bought a bat for \$1.78 and a ball for \$1.20. How much change should he receive from \$5.00?

6. Tom was the club treasurer. On the first of the month the balance on hand was \$6.43. During the month he received \$5.78 and paid bills amounting to \$7.87. What was the balance at the end of the month?

7. On 3 arithmetic tests George's scores were 80, 84, 76. What was his average score? (Turn to page 53 if you need help.)

8. Three girls agreed to share equally the expenses of a trip to the park. Carfare was \$.84 and lunches cost \$1.35. What was each girl's share of the expenses?

9. Fred bought a tube of toothpaste for \$.63 and a toothbrush for \$.45. How much change did he get from \$1.50?



Airline Distances

The picture above gives the airline distances in miles between certain cities in the United States.

1. How much farther is a trip from Los Angeles to New York than a trip from Los Angeles to Chicago?

2. What is the difference in the distance from Boston to New York and the distance from Boston to Chicago?

3. How many miles less is the trip between New York and Miami than the trip between San Francisco and Chicago?

4. How many miles more is the trip from Chicago to Seattle than the trip from Houston to Atlanta and on to New York?

5. What is the total distance from Miami to New York and then to Chicago and on to San Francisco?

6. Mr. Smith flew from Los Angeles to New York, then to Chicago, and back to Los Angeles. How far did he fly?

7. If an airplane flies from Atlanta to New York in 4 hours, what is its average speed per hour?

8. How much farther is it from Houston to Los Angeles than from Chicago to Boston?

Using Money Numbers

In adding, subtracting, multiplying, and dividing money numbers, think of them as ordinary numbers. Use the dollar sign and cents point correctly. There must always be two places for dimes and cents to the right of the cents point.

Add: Write the dollar sign at the left of the first addend and the sum. Use the cents point in each number. Keep the cents points in a vertical line.

1.

$ 5.69	$15.00			$49.50	$12.34
.05	2.50			10.25	23.45
.25	.09	$.89	$62.49	18.75	34.56
12.75	30.20	.95	43.75	20.00	45.78

Subtract: Write the dollar sign at the left of the minuend and the difference. Use the cents point in each number. Keep the cents points in a vertical line.

2.

$2.75	$4.69	$65.40	$37.10	$90.00	$15.48
.25	1.89	48.27	1.45	25.39	14.79

Multiply: Use the dollar sign and the cents point with the multiplicand and the product.

3.

$.26	$2.75	$7.80	$1.94	$9.25	$5.67	$1.82
4	6	8	5	3	7	4

Divide: You may have to use the dollar sign and the cents point with the dividend and the divisor, or with the dividend and the quotient.

4. $4\overline{)\$3.68}$ $2\overline{)\$8.90}$ $7\overline{)\$6.58}$ $\$.05\overline{)\$5.25}$ $\$.08\overline{)\$6.56}$

Solve these problems:

5. A bicycle priced at $53.75 was reduced to $42.97 for a special sale. How much was the price reduced?

6. At the roadside stand John sold 4 bushels of tomatoes at $2.75 a bushel. How much money did he receive for them?

Buying at Sale Prices

Read the advertisement and answer the following questions:

1. What is the difference between the sale price and the regular price of each of the stepladders?

2. How much less is the sale price of a 4-foot stepladder than the sale price of a 6-foot ladder?

3. About how much per foot is a 5-foot stepladder?

4. What is the price per foot, to the nearest cent, of an 8-foot stepladder?

Solve these problems about buying at sale prices:

5. Nancy can get a coat at a special sale price of $15.98. The regular price is $21.50. How much will she save by getting the coat on special sale?

6. Nancy's mother can get nylon hose which usually cost $1.25 a pair on sale at 3 pairs for $3.27. How much less is the sale price per pair than the regular price?

Step 1. Divide $3.27 by 3 to find the sale price per pair.
Step 2. Subtract the sale price per pair from $1.25.

7. Ann's mother bought an apron and a dress at a special sale for $9.84. The regular price of the apron was $1.40 and of the dress $9.50. How much did she save on the two articles?

8. A hat that was regularly priced at $2.00 was reduced to $1.69. How much would be saved by buying at the sale price?

9. Betty bought a book for $.98 and some note paper and envelopes for $.35. How much change should she receive from $2.00?

Solving Problems

For each problem below write A, S, M, or D to show how you will answer the problem question. Then find the answer.

1. Mr. Roberts got 1265 eggs in January and 968 eggs in February. How many eggs did he get in both months?

2. Mr. Liner's best cow gave 2000 pounds of milk in January. One of his poorest cows gave 985 pounds. How much less milk was given by the poorer cow than by the best cow?

3. The Porcupine Mountains are 2023 feet above sea level. Lake Erie is 574 feet above sea level. What is the difference between the height above sea level of the lake and the mountains?

4. Mary read that the Canal Zone has an area of 559 square miles and that Hawaii has an area of 6407 square miles. How much larger is Hawaii than the Canal Zone?

5. Susan saved $8.95 in January and $3.85 in February. How much more does she need to buy a radio priced at $15.00?

6. Betty's mother bought 4 pounds of steak at $.89 a pound. How much did the four pounds of meat cost?

7. Harry paid $1.65 for 3 packets of stamps. He sold one packet to Phil for $.60. How much profit did Harry make on that sale?

8. There were 1075 tickets sold for the first high school game and 997 tickets sold for the second game. How many fewer tickets were sold for the second game than for the first game?

9. Jerry's father paid $98.50 for a radio, $19.98 for a table, and $17.98 for a chair. How much did he spend?

Review and Practice

Find the answer for each example and problem on this page.

Add:

1.

92	967	983	706	6439	$10.11	$51.03
86	56	464	430	3897	20.31	21.50
76	45	895	208	4576	24.23	40.25
94	43	576	9090	5362	5.34	15.00

Subtract:

2.

175	601	4841	$89.07	$50.00	$85.75
88	127	3655	27.89	23.54	36.99

Multiply:

3.

83	$.75	235	542	$6.15	$2.50	$1.15
3	6	3	8	4	7	5

Divide:

4. $9\overline{)450}$ $5\overline{)259}$ $3\overline{)906}$ $2\overline{)684}$ $5\overline{)549}$ $6\overline{)865}$ $4\overline{)700}$

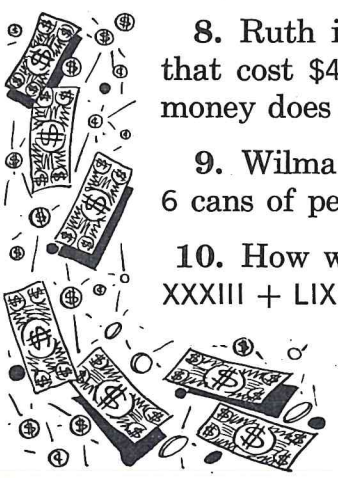
5. $\$.08\overline{)\$.48}$ $\$.07\overline{)\$.75}$ $\$.03\overline{)\$7.02}$ $5\overline{)\$.45}$ $7\overline{)\$.84}$ $5\overline{)\$7.25}$

Find the fractional parts:

6. $\frac{3}{8}$ of 16 = ? $\frac{4}{5}$ of 25 = ? $\frac{2}{3}$ of 27 = ? $\frac{1}{6}$ of 54 = ?

Solve these problems:

7. Herbert's father bought 3 shirts at $3.95 each. He asked Herbert to find out the total cost. Was Herbert correct when he said that the cost of the 3 shirts was $10.85?



8. Ruth is saving money to buy a bicycle. She saw one that cost $43.55, but she has only $35.60. How much more money does she need to buy the bicycle?

9. Wilma went to the grocery for her mother. She bought 6 cans of peaches for $2.64. What was the cost of each can?

10. How would you find the sum of these numbers:
XXXIII + LIX + XCV + XXVII + XX = ? DIX + IV + XCIX = ?

To Help You Remember

The page numbers after the questions tell you where to turn for help if you need it.

▶ *To think and talk about:*

1. Explain the difference between adding two-place, three-place, and four-place numbers. (11, 13, 68)

2. Explain the difference between the subtraction of two-place, three-place, and four-place numbers. (21, 22, 71)

3. Explain how to write Roman numbers, using I, V, X, L, C, D, and M. (66)

4. Explain the meaning of each figure in this number: 987654321. Divide it into periods (millions, thousands, and ones) and explain how to read each period. (6-7)

5. Where would you place commas to make this number easier to read? 327087504 Read the number. (7)

6. Work this example and explain how to check your answer. $4\overline{)390}$ (49, 52)

▶ *To think about and write:*

1. Work these addition examples. Check each answer.

37	54	125	754	6489
19 (11)	68 (11)	87 (13)	528 (13)	3742 (68)

2. Work these subtraction examples. Check each answer.

75	536	406	6724	5007
26 (21)	47 (22)	137 (22)	817 (70)	1869 (71)

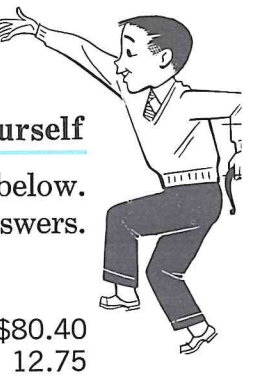
3. Write the following numbers as Roman numbers. (66, 67)

14 . 17 42 76 163 554

4. Find the answers for these uneven division examples. Check each answer.

$4\overline{)35}$ (42) $3\overline{)62}$ (49) $5\overline{)82}$ (50) $4\overline{)205}$ (52) $4\overline{)807}$ (55)

5. Multiply: $5 \times 327 = ?$ (36) $9 \times 703 = ?$ (36)



Testing Yourself

Find the answers for the examples and problems below. Work quickly, but take time to get the correct answers.

Add:

1.

56	96	382	129	3684	$12.45	$80.40
82	88	496	487	5497	10.67	12.75
54	416	577	9540	1255	4.85	20.00
87	37	486	766	9876	25.60	3.98

Subtract:

2.

564	604	3507	$39.02	$50.21	$80.01
85	135	468	9.45	12.35	27.93

Multiply:

3.

48	$.98	325	680	$3.05	$1.89	$2.53
2	9	4	8	7	5	3

Divide:

4. $8\overline{)643}$ $3\overline{)195}$ $7\overline{)705}$ $3\overline{)965}$ $3\overline{)546}$ $7\overline{)989}$ $8\overline{)994}$

5. $\$.05\overline{)\$.27}$ $\$.04\overline{)\$.92}$ $\$.06\overline{)\$8.50}$ $5\overline{)\$.66}$ $8\overline{)\$3.28}$ $4\overline{)\$18.76}$

Find the fractional parts:

6. $\frac{1}{2}$ of 14 = ? $\frac{3}{5}$ of 35 = ? $\frac{7}{8}$ of 56 = ? $\frac{5}{6}$ of 12 = ?

Solve these problems:

7. Helen's mother bought 3 dozen rolls at $.27 a dozen. How much did the rolls cost?

8. Martha bought a book for $1.15 and a box of pencils for $.28. How much change should she receive from $2.00?

9. If you want to divide 49 marbles equally among 4 boys, how many marbles will each boy get and how many marbles will be left?

10. Yesterday the coach bought 3 new softballs at $1.75 each and a new bat at $1.50. What was the total cost?

Chapter 6

At the Library

1. The librarian told the children that 5436 books were borrowed from the library during the month. At this rate how many books would be borrowed in 3 months?

Study the example for the problem. The multiplicand is a four-place number. To find the product, multiply the ones, the tens, the hundreds and the thousands. You multiply thousands in the same way you multiply ones, tens or hundreds.

$$\begin{array}{r} 5436 \\ \times 3 \\ \hline 16{,}308 \end{array}$$

The answer is 16,308 books. Explain how to find it.

Find the products for the examples below. Check your answers. Change ones to tens, tens to hundreds, hundreds to thousands, and thousands to ten-thousands when necessary.

2.	2134 × 2	8234 × 2	1312 × 4	7523 × 3	3262 × 2	7231 × 4	2861 × 2
3.	5682 × 4	1112 × 5	9126 × 3	2618 × 3	4424 × 4	1001 × 7	7132 × 3
4.	4733 × 2	9821 × 2	4471 × 2	9462 × 2	1640 × 5	7863 × 3	2214 × 3
5.	7219 × 2	1312 × 7	5928 × 3	3231 × 3	9101 × 6	2932 × 3	8501 × 5
6.	2071 × 3	8263 × 3	2653 × 2	6781 × 4	1237 × 2	5123 × 4	2409 × 4

Multiplying Four-Place Numbers

Find the products for these examples. Check your answers.

1.	2187 × 4	1076 × 5	3198 × 3	6132 × 6	7245 × 4	4254 × 3	6148 × 7
2.	2454 × 3	1986 × 4	1328 × 7	5653 × 4	8867 × 6	3489 × 9	9534 × 5
3.	\$12.30 × 3	\$43.49 × 2	\$50.70 × 2	\$20.11 × 9	\$62.79 × 3	\$15.12 × 8	
4.	\$26.50 × 6	\$10.49 × 7	\$31.72 × 4	\$18.15 × 7	\$43.65 × 4	\$84.67 × 3	

Solve these problems:

5. Dick's brother earned \$36.50 a week last summer. At this rate how much did he earn in 6 weeks?

6. At the high school there were 2675 tickets sold at the first home basketball game. At this rate how many tickets will be sold at the 5 home games this season?

7. The average electric bill at the Meyers' home is \$12.50 a month. How much can the Meyers expect to pay for electricity in the next 9 months?

8. Betty's father made a 2198-mile airplane trip 7 times last year. How many miles did he fly on all of these trips?

9. The school bought 6 softball bats for the gym. At \$1.69 each, how much did they cost?

10. If another kind of softball bat costs \$1.39, how much will 5 of these bats cost?

11. The school bought 3 sets of reference books that cost \$44.75 a set. What was the cost of the 3 sets?

You will remember:

- You multiply *thousands* in the same way that you multiply *hundreds*, *tens*, or *ones*.

Harvesting Apples

These problems tell about harvesting apples. Find the answer for the question in each problem.

1. Last year's crop was 1298 bushels of apples. This year's crop is estimated at 1500 bushels. How much larger than last year's crop is this year's crop expected to be?

2. The men picked 79 bushels of one kind of apples, 195 bushels of another kind, and 19 bushels of a third kind. How many bushels did they pick altogether?

3. One of the men put 125 pounds of apples into bags which held 5 pounds each. How many bags did he fill?

4. A buyer paid $98.50 each for 3 trailer loads of apples. How much did he pay for all three loads?

5. Some of the apples were sold for $3.96 a bushel. A lady bought 3 bushels. How much change should she get from $20?

This is a two-step problem.

Step 1. Multiply to find the cost of 3 bushels of apples.

Step 2. Subtract to find the difference between $20 and the cost.

$3.96	$20.00
×3	−11.88
$11.88	$ 8.12

6. Another lady bought one bushel of apples for $3.96 and another bushel for $2.60. What change did she get from $7.00?

7. Five baskets of apples weighed 230 pounds. If the empty baskets weigh 2 pounds each, what was the net weight of the apples in the 5 baskets?

Solving Problems

Read each problem carefully. Be sure that you understand what it tells you and what you are asked to find. Write A, S, M, or D to show whether you add, subtract, multiply, or divide to find the answer. If there are two steps write A, S, M, or D for each step. Then find the answer.

1. Only 6998 of the 9287 registered voters in a city voted. How many did not vote?

2. Doris has \$1.60 to spend for 6¢ air mail stamps. How many can she buy and how much money will she have left?

3. Ellen bought a jacket for \$8.98 and shoes for \$7.95. How much change should she receive from \$20?

4. Jerry had \$3.75. He worked 4 hours at 65¢ an hour. How much money did he have then? (This is a 2-step problem.)

Step 1. Multiply 65¢ by 4. Why?
Step 2. Add \$3.75 and the product of step 1. Why?

5. Find the cost of 5 gallons of gasoline at 29¢ a gallon and a quart of oil at 40¢.

6. Harry needs \$5.80 to buy a birthday present. He has saved \$3.75. How much more money does he need?

7. John sold 6 baskets of tomatoes at \$2.25 each. How much change should the buyer receive from \$15?

8. Dick can buy a new bicycle for \$65.50, but he can get a good used bicycle for \$39.98. How much less will the used bicycle cost than the new one?

9. Mr. Johnson bought Henry a football for \$4.49, and a jacket for \$3.75. How much change should he get from \$10?

10. How much a week should Jim save if he is to save \$9.00 in 4 weeks?

11. Find the cost of 4 automobile tires at \$23.50 each, and a set of seat covers at \$22.75.

12. Find the difference between 5 feet and 79 inches.

Mixed Practice

Find the answers to these examples. Check each answer.

Multiply:

1.

71	93	158	269	5814	2045	1428	3628
8	6	6	7	5	9	6	5

2.

$.14	$.85	$5.16	$6.50	$4.67	$13.49	$76.38
7	9	5	4	8	7	6

Add:

3.

40	607	320	931	$ .05	$5.15	$30.00
9	95	405	192	.75	1.48	15.45
97	300	600	458	9.99	3.20	42.00
3	80	179	700	.08	2.39	24.95
25	9	368	412	.12	4.10	50.05

Subtract:

4.

93	85	$.75	420	501	7002	9234	$70.25
8	37	.29	56	243	765	3579	24.88

Divide:

5. $9\overline{)63}$ $8\overline{)59}$ $3\overline{)62}$ $4\overline{)48}$ $3\overline{)64}$ $5\overline{)65}$ $4\overline{)95}$ $6\overline{)83}$

6. $7\overline{)87}$ $6\overline{)300}$ $4\overline{)203}$ $3\overline{)153}$ $6\overline{)188}$ $4\overline{)743}$ $5\overline{)960}$

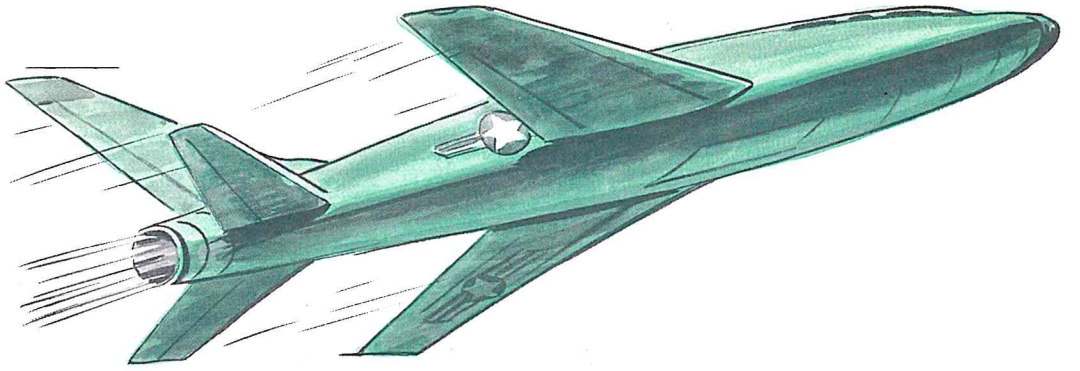
Solve these problems:

7. If $\frac{5}{6}$ of the 30 days in April are clear, how many days are clear?

8. Ben bought a small box of candy for $.59 as a birthday gift for his sister. How much change should he get from $1.00?

9. Bob's uncle got 200 eggs on Monday, 178 on Tuesday, 212 on Wednesday, 199 on Thursday, and 185 on Friday. How many eggs did he get altogether in those five days?

10. Mary bought 3 boxes of strawberries at $.58 a box. How much change should she get from $2?



Dividing Four-Place Numbers

1. The pilot of a jet plane flew 1530 miles in 3 hours. What was his speed in miles per hour?

To find the answer, divide 1530 by 3.

Since 1 is less than 3, change 1 thousand to 10 hundreds. Divide 15 hundreds by 3. Bring down 3 tens. Divide 3 tens by 3. Bring down 0. There are no ones to divide, so write 0 in ones' place in the quotient. What is the answer?

$$3\overline{)1530} = 510$$

Find and check the answers for the examples below. In the examples in rows 2, 3, and 4 there are not enough thousands to divide, so change thousands to hundreds. In rows 5, 6, 7, and 8 there are enough thousands to divide.

2.	$4\overline{)2000}$	$5\overline{)1004}$	$3\overline{)2106}$	$8\overline{)5609}$	$5\overline{)3050}$	$7\overline{)6375}$
3.	$2\overline{)1864}$	$6\overline{)5468}$	$4\overline{)3690}$	$6\overline{)5498}$	$9\overline{)7587}$	$3\overline{)2926}$
4.	$8\overline{)6904}$	$6\overline{)4079}$	$2\overline{)1738}$	$5\overline{)2392}$	$7\overline{)6069}$	$4\overline{)3945}$
5.	$2\overline{)6000}$	$4\overline{)8002}$	$3\overline{)6900}$	$7\overline{)7706}$	$2\overline{)8006}$	$5\overline{)5007}$
6.	$2\overline{)6814}$	$5\overline{)5549}$	$4\overline{)8364}$	$6\overline{)6489}$	$2\overline{)8746}$	$3\overline{)9857}$
7.	$3\overline{)6093}$	$4\overline{)8047}$	$3\overline{)6390}$	$8\overline{)8860}$	$4\overline{)9669}$	$7\overline{)7778}$
8.	$5\overline{)7895}$	$7\overline{)9784}$	$3\overline{)8961}$	$6\overline{)8899}$	$8\overline{)9992}$	$4\overline{)9875}$

You will remember:

- You divide *thousands* in the same way that you divide *hundreds*, *tens*, or *ones*.

Dividing Dollars and Cents

Study the two division examples below. Think of the dollars, dimes, and cents as cents.

```
      398                      398
$.07)$27.86          7 cents)2786 cents
      21                       21
      68                       68
      63                       63
       56                       56
       56                       56
```

Work these examples. Sometimes there will be a remainder.

1. $.08)$48.88 $.03)$15.95 $.05)$31.60 $.09)$39.23

2. $.02)$68.84 $.04)$86.49 $.06)$79.26 $.03)$86.90

Study the example at the right below. Then find the answers for these examples:

3. 4)$28.48 5)$40.60 3)$19.62 6)$20.40

4. 2)$64.69 3)$96.99 4)$84.48 5)$79.75

5. 3)$69.75 2)$48.30 7)$77.98 6)$94.50

6. 4)$98.36 5)$58.70 8)$89.85 3)$89.52

```
     $15.98
3)$47.94
      3
      17
      15
       29
       27
        24
        24
```

Solve these problems:

7. Mr. Hendrickson sold 4 bushels of peaches for $11.80. How much did he get per bushel?

8. How much a week should Dick save in order to save $10.00 in 8 weeks?

9. Five boys agreed to share the expenses of a trip to the city. The trip cost $11.75. How much should each pay?

10. Mr. Gray bought 3 tires for $50.25. What was the cost of each tire?

Multiplying by Ones and Tens

1. Bill put 12 eggs into each of 23 cartons. How many eggs did he use in all?

Multiply by ones to find the first partial product.

Multiply by tens to find the second partial product.

Add the partial products to find the total product.

```
 12  multiplicand
×23  multiplier
 36  first partial product
 24  second partial product
276  total product
```

Notice that multiplying by tens gives a product ten times as large as multiplying by ones gives. Do you see why the 4 in the second partial product belongs in tens' place and the 2 belongs in hundreds' place?

2. In example A there are no ones in the multiplier, so there are no ones or tens in the first partial product.

3. Example B is a *short way* of working example A. Write 0 in the ones' place and multiply by the tens.

A	B	C	D
22	22	40	40
×30	×30	×20	×20
00	660	00	800
66		80	
660		800	

4. In example C there are no ones in either the multiplier or the multiplicand. So there are no ones or tens in the product. The short way to work this example is to write zeros in ones' and tens' places in the product. Then multiply tens by tens as in example D.

Find the products. Use the short way for examples in row 7.

5.	12	32	14	45	11	31	23	20	42	21
	24	31	12	11	34	22	13	14	21	23
6.	23	12	24	21	22	46	95	11	32	11
	32	42	21	43	44	11	11	96	32	58
7.	34	21	13	44	32	10	40	30	20	10
	20	40	30	20	20	50	10	30	40	60

Sensible Answers for Problems

As soon as you write the example for a problem, you should be able to *estimate* the answer, or tell about how large it will be. Doing this will help you see whether or not the exact answer you get is a sensible answer.

Read this problem:

1. Tom spent \$2.85 for a shirt and \$1.25 for a tie. How much did he spend for both?

\$2.85	addend
+1.25	addend
?	sum

You can see that the answer will be more than \$3.00 because \$2.00 + \$1.00 = \$3.00. It will be less than \$5.00 because \$3.00 + \$2.00 = \$5.00. Now find the exact answer.

2. Bob put 15 books on each of 5 shelves. How many books did he put on all the shelves?

Do you see why the answer will be more than 50 and less than 100?

$$\begin{array}{r} 15 \\ \times 5 \\ \hline ? \end{array}$$

For each problem below, write the example and estimate the answer. Work the example and use your estimated answer to see if your exact answer is sensible.

3. Tom bought 4 tickets to the circus. Each ticket cost 75¢. How much did he pay for the tickets?

4. Barbara's mother paid \$3.29 for meat and \$1.98 for groceries. How much did she spend?

More Multiplication by Ones and Tens

1. In the auditorium at Gray School there are 21 rows of seats with 36 seats in each row. How many seats are there in the auditorium?

Multiply by ones. 1 × 6 = 6. Write 6 in ones' place. 1 × 3 tens = 3 tens. Write 3 in tens' place.

Multiply by tens. 2 tens × 6 ones = 12 tens = 1 hundred and 2 tens. Remember 1 hundred. Write 2 in tens' place. 2 tens × 3 tens = 6 hundreds, 6 hundred + 1 hundred = 7 hundreds. Write 7 in hundreds' place.

$$\begin{array}{r} 36 \\ \times 21 \\ \hline 36 \\ 72 \\ \hline 756 \end{array}$$

Add the partial products. How many seats were there?

2. Study example A. To find the first partial product you must change ones to tens.

3. Study example B. Ones are changed to tens in finding the first partial product. Tens are changed to hundreds in finding the second partial product.

4. Study example C. It is like example B except that in adding the partial products 10 tens are changed to 1 hundred and 10 hundreds are changed to 1 thousand.

A	B	C
14	16	12
×13	×43	×87
42	48	84
14	64	96
182	688	1044

Find the products. Use the short way when you can. Watch for changes when adding the partial products. Check your work.

5.	38	29	24	19	14	18	37	24	13	49
	21	31	32	51	62	50	20	40	60	20
6.	13	14	15	16	12	15	13	12	47	29
	15	14	13	12	16	12	14	15	12	13
7.	18	45	25	14	19	18	17	15	13	17
	22	22	23	35	42	43	52	65	74	35
8.	49	12	24	15	28	14	13	48	14	16
	21	84	14	16	23	45	57	22	74	64

More about Two-Place Multipliers

1. Mary's father drives his car from city to city on business. On one trip he kept a record of the time he spent driving. He drove 23 hours. At an average speed of 42 miles per hour, how far did he drive?

Multiply by ones. 3 × 2 ones = 6 ones. 3 × 4 tens = 12 tens = 1 hundred and 2 tens.

Multiply by tens. 2 tens × 2 ones = 4 tens. 2 tens × 4 tens = 8 hundreds.

Add the partial products. What is the answer?

$$\begin{array}{r} 42 \\ \times 23 \\ \hline 126 \\ 84 \\ \hline 966 \end{array}$$

Find the products for these examples. Check your work.

2.

61	54	41	21	20	31	21	50	31	21
15	12	24	35	48	17	46	19	29	47

3. Study example A. In it you must change ones to tens and tens to hundreds to find the first partial product.

4. Study example B. Notice that in this example you must also change tens to hundreds as you find the second partial product.

A	B
22	28
×36	×35
132	140
66	84
792	980

Find the products. Check your work.
Watch for changes as you add the partial products in row 7.

5.

64	33	12	22	23	34	68	23	58	26
14	24	49	45	39	23	13	25	12	14

6.

24	25	37	12	19	14	27	17	14	16
39	34	23	89	46	68	29	57	78	49

7.

31	83	71	32	26	43	39	15	49	14
26	18	17	25	37	29	24	68	29	79

You will remember:

To multiply by a two-place number, you first *multiply by ones*, then *multiply by tens*, and *add* the *partial products*.

Multiplying Numbers That Stand for Money

1. Each fifth-grade child brought $.35 to school to pay bus fare for a trip to the park. There were 22 children in the class. How much money did they bring in all?

Multiply $.35 by 22. Multiply by ones, multiply by tens and add the partial products. You multiply money numbers just as you multiply other numbers.

Notice that the dollar sign and the cents point are used only in the multiplicand and in the total product. Always be sure to use them correctly.

$$\begin{array}{r} \$.35 \\ \times 22 \\ \hline 70 \\ 70 \\ \hline \$7.70 \end{array}$$

Find the products for the examples below. Use the short way to multiply when you can. Check your answers.

2.	$.32	$.45	$.12	$.14	$.19	$.12	$.25
	21	11	16	14	51	73	21
3.	$.54	$.20	$.33	$.68	$.12	$.25	$.19
	12	48	24	13	49	34	46
4.	$.40	$.10	$.31	$.22	$.11	$.15	$.19
	20	60	30	40	50	50	40

Solve these problems:

5. Bob sold 11 baskets of grapes at $.97 a basket. How much money did the customer pay for them?

6. John's father earns $15.90 a day. How much does he earn in a 5-day week?

7. Ruth's mother bought a 14-pound ham at $.76 a pound, and a bag of sugar for $1.05. How much did she pay for both?

8. The children plan to sell cookies at $.25 a dozen. How much money should they get for 19 dozen?

You will remember:

- You multiply money numbers in the same way that you multiply other numbers. Use the dollar sign and the cents point only in the multiplicand and in the total product.

Sensible Answers for Subtraction Problems

1. Roy and his father had 210 chickens. They sold 45 of them. How many chickens did they have left?

You know that when you subtract 45 from 210, the answer will be smaller than 210, because the minuend is equal to the sum of the subtrahend and the difference. You also know that the answer will be larger than 100, because 100 + 45 = 145 which is a smaller number than the minuend. Decide what would be a sensible answer. Then find the exact answer. How much does it differ from your estimated answer?

210 minuend
−45 subtrahend
? difference

Read each of the following problems carefully and decide what to do to solve it. Write the example and decide what would be a sensible answer. Work the example and use your estimate to see whether your answer makes sense.

2. Betty paid $3.98 for a skirt. She gave the clerk $5. How much change should she get?

3. A farmer got 97 eggs on Monday and 127 eggs on Tuesday. How many more eggs did he get on Tuesday than on Monday?

4. Mrs. Howard spent $6.90 for canned goods and $2.69 for fruits and vegetables. How much less did she spend for the fruits and vegetables than for the canned goods?

5. The early morning temperature was 37 degrees. At noon the temperature was 63 degrees. How much warmer was it at noon than in the early morning?

6. Adults' movie tickets cost $.70. Children's tickets cost $.25. What is the difference between the two prices?

7. There are 719 children at the school Christine attends, and 465 at the school her cousin Mark attends. How many more pupils attend the larger school than the smaller one?

8. There are 299 boys and 340 girls at Glendale School. How many fewer boys than girls are enrolled?

Review and Practice

Find the answers for the examples and problems on this page.

Multiply:

1.

932	491	198	823	$2.15	$5.83	$6.53
2	7	5	6	6	3	5

2.

1917	1812	1179	4287	$25.67	$86.97
5	8	5	3	3	4

3.

18	14	30	83	25	47	$.33	$.82	$.27
35	73	39	19	36	24	33	16	25

Divide:

4. $4\overline{)480}$ $7\overline{)986}$ $8\overline{)9795}$ $3\overline{)\$7.68}$ $3\overline{)\$25.72}$ $\$.02\overline{)\$46.08}$

Add:

5.

519	240	$5.50	$ 1.75	$56.84	1280	7089
38	825	.98	55.00	5.25	9201	1720
57	462	4.75	6.78	32.50	7733	2846

Subtract:

6.

44	667	560	800	7281	$89.41	$80.00
38	76	407	583	361	69.62	27.99

Find the fractional part:

7. $\frac{1}{4}$ of 56 = ? $\frac{2}{3}$ of 30 = ? $\frac{3}{5}$ of 50 = ?

8. The children made 144 cookies to sell at the Bake Sale. They put 6 cookies in each box. How many boxes of cookies did they have?

9. When there are 16 pounds of apples in each basket, how many pounds of apples will there be in 17 baskets?

10. What will be the cost of a pound of cheese at $.80, and 4 pounds of butter at $.79 a pound?

To Help You Remember

The page numbers after the questions and examples tell you where to turn for help if you need it.

▶ *To think and talk about:*

1. Explain how the steps in working these two examples are different: 3×321 and 3×6875. (36, 81)

2. When you multiply by a two-place multiplier, why are there no ones in the second partial product? (88)

3. What do the dividend and the divisor stand for in this example: $.05\overline{)\$35.25}$? What will the quotient stand for? (58)

4. Explain the difference between a one-step problem and a two-step problem. (73)

5. Explain how you can tell whether your answer for an addition example, a multiplication example, or a subtraction example is a sensible answer. (89, 93)

6. Name the three parts of a division example. What is the name of the answer? (38)

▶ *To think about and write:*

Find the answers for the following examples. Check your answers.

1. $6\overline{)8463}$ (86) **2.** $6\overline{)4872}$ (86) **3.** $\frac{1}{4}$ of $48 = ?$ (45)

4. $500 - 114$ (22) **5.** 48×28 (90, 91) **6.** $6794 + 5872$ (68) **7.** 9687×5 (81)

For each of the problems below, write the example. Then write the largest number and the smallest number that you think would be a sensible answer for the example. Then find the exact answer. (89, 93)

8. Janet bought a book that cost $1.98. She gave the clerk $5.00. How much was her change?

9. A bushel of potatoes weighs 60 lbs. What is the weight of 45 bushels of potatoes?

Testing Yourself

Find the answer for each example on this page.

Add:

1.

24	126	$3.15	$ 2.30	$76.33	6212	7167
37	800	7.29	3.02	45.40	7314	6072
715	506	2.07	51.56	2.02	8003	5285

Subtract:

2.

62	485	529	700	9521	7750	$57.00
39	56	387	426	386	2649	39.65

Multiply:

3.

7130	$7.95	$34.25	16	41	54	28
7	4	7	66	27	19	37

Divide:

4. $2\overline{)861}$ $5\overline{)655}$ $8\overline{)\$9.84}$ $4\overline{)\$80.05}$ $5\overline{)\$30.60}$ $7\overline{)8691}$

Find the fractional parts:

5. $\frac{1}{8}$ of 96 = ? $\frac{5}{8}$ of 80 = ? $\frac{5}{6}$ of 78 = ?

Solve the problems:

6. John wants to buy a bicycle that costs $49.50. He has saved $19.75. How much more money does he need to buy the bicycle?

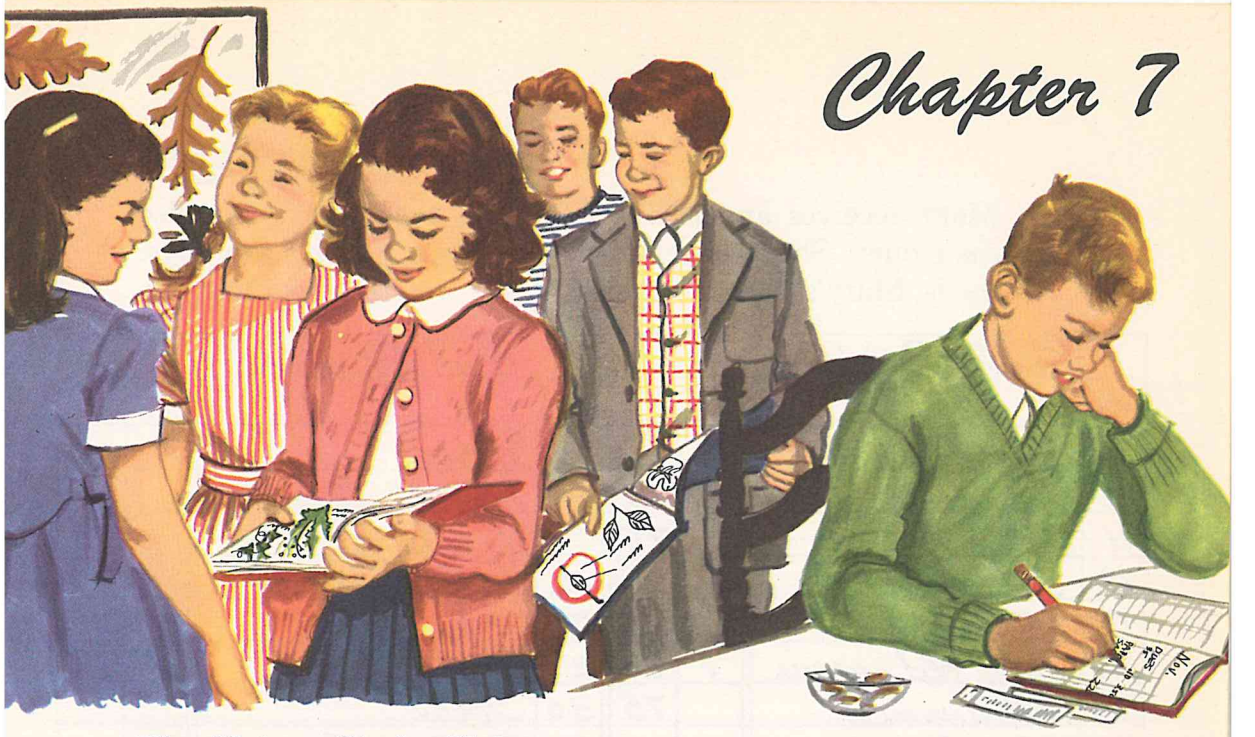
7. George put 65 stamps on each page of his stamp book. He filled 15 pages and had 25 stamps left. How many stamps did he have in all?

8. At $.60 a pound, how much will $\frac{3}{4}$ lb. of candy cost?

9. Betty had $2.19 and earned $.75. Then she spent $.35 for a movie. How much money did she have left?

10. On a vacation trip, Sue and her parents drove 385 miles the first day, 423 miles the second day, and 398 miles the third day. How far did they drive in the three days?

Chapter 7



The Nature Study Club

The fifth graders at Ogden School organized a Nature Study Club. They collected and studied flowers and plants. Each member kept a scrap book for his collection.

1. Club dues are $.10 a month. How much money should the treasurer collect each month from the 35 members?

2. In October the club earned $3.24 by selling old newspapers, and $9.27 by selling candy. How much more money did they earn in October by selling candy than they earned that month by selling old newspapers?

3. The club held 3 parties during the year. The total expenses for the three parties were $7.59. What was the average expense per party?

4. In November the treasurer collected money as follows: dues, 35 members at $.10 each; paper sale, $2.20; pop corn sale, $1.95. How much money was collected that month?

5. One Saturday a teacher and 31 members of the club took a trip to the country. The bus fare was $.28 for each person. What was the total fare?

Keeping a Cash Account

Mary receives an allowance of $.75 each week. She also earns money. She uses her money to pay for things she buys. Here is Mary's cash account for the month of November.

Cash Received				Cash Paid Out			
NOV.				NOV.			
1	Cash on hand	$3	14	3	Movie	$	25
4	Allowance		75	5	Basketball game		25
11	Allowance		75	7	Candy		39
13	Errand		25	12	Rubbers	1	49
18	Allowance		75	21	Movie		25
20	Sold old papers	1	20	27	Bank	1	79
25	Allowance		75	30	Total		
30	Total			30	Cash on hand		

1. Find the amount of cash received in November.

2. Find the amount of cash paid out in November.

3. Find the amount of cash on hand at the end of the month.

4. How would you find the cash on hand on any day of the month?

5. How much cash on hand did Mary have on November 14?

6. What was the total amount of Mary's allowance during November?

7. What was the total amount Mary earned in November?

8. How should Mary start her cash account for December?

9. What is the difference between the amount of cash on hand on November 1 and on November 30?

Multiplying by Ones and Tens

1. Study the completed examples below. In examples like these you first multiply by ones and then by tens. Notice that each second partial product has thousands, hundreds, and tens, but no ones. There are no ones in the second partial products because tens × ones = tens.

A	B	C	D	E
52	$.60	23	54	$.28
×21	×70	×82	×30	×53
52	$42.00	46	1620	84
104		184		140
1092		1886		$14.84

- In example A the step to watch is 2 tens × 5 tens. This equals 10 hundreds or 1 thousand. Write 1 in thousands' place and 0 in hundreds' place. A short way is used in example B.
- To find the second partial product in C, change tens to hundreds and hundreds to thousands. A short way is used in D.
- In example E you will also have to change ones to tens in finding the first partial product.

Find the products. Be sure to change ones to tens, tens to hundreds, and hundreds to thousands when necessary.

2.	61	21	61	72	$.51	21	31	41	21	$.31
	31	52	21	21	41	61	61	51	71	51
3.	40	80	30	70	$.90	31	72	63	51	$.82
	50	60	90	80	40	70	20	30	40	30
4.	57	74	33	22	$.34	85	68	75	13	$.57
	21	51	42	60	30	60	41	81	92	31
5.	39	29	46	37	$.16	45	17	39	25	$.38
	92	72	52	32	74	62	94	82	63	42
6.	32	21	71	43	$.32	59	36	39	28	$.37
	43	64	71	92	63	51	32	62	73	82

More about Two-Place Multipliers

1. Notice that in each example below the first partial product is a three-place number, and the second partial product is a four-place number. Study each example carefully. Be ready to explain how the answer was found.

A	B	C	D
\$.70	52	63	86
×65	×84	×25	×72
3 50	208	315	172
42 0	416	126	602
\$45.50	4368	1575	6192

Find the products for the examples below. Check your work.

2.	54	73	82	52	61	71	51	21	21	51
	22	23	34	42	55	69	74	75	77	78
3	84	93	64	82	74	92	54	32	72	64
	32	43	52	54	62	64	72	74	83	92
4.	73	52	54	82	52	43	62	52	64	52
	27	26	24	35	36	37	35	38	28	46
5.	78	57	69	75	95	83	25	62	95	39
	23	28	39	34	42	59	68	75	83	98
6.	91	64	28	82	54	63	72	83	62	58
	64	72	65	63	96	38	44	63	98	69

7. \$.51	\$.40	\$.71	\$.82	\$.53	\$.62	\$.74	\$.92
37	97	72	63	28	37	23	45
8. \$.73	\$.62	\$.42	\$.62	\$.77	\$.53	\$.59	\$.99
26	35	39	36	37	77	25	72

Solve these problems:

9. At \$.89 each, what is the cost of 24 spelling books?

10. Bill and his uncle sold 75 boxes of strawberries to a grocer at 25¢ a box. How much money did they get?

Buying Supplies for the School Store

The two children in the picture above bought these supplies for the school store:

12 dozen water color brushes at $.96 a dozen
6 dozen boxes of water colors at $.54 a box
12 notebooks at $.20 each
20 dozen wax crayons at $.99 a dozen
15 pounds of modeling clay at $.65 a pound
25 dozen rulers at $.48 a dozen

Answer the following questions:

1. What was the total cost of each of the items that they bought?

2. What was the total cost of all the items?

3. How many boxes of water colors did they buy?

4. How many rulers did they buy?

5. How many water color brushes did they buy?

6. Sales in the school store for a week were: Monday, $7.15; Tuesday, $5.75; Wednesday, $3.29; Thursday, $4.19; Friday, $3.37. What was the total amount of sales that week?

7. What was the average amount of sales per day during that week?

8. One week 35 notebooks were sold at $.25 each. How much money was received for these notebooks?

Solving Two-Step Problems

Read each problem carefully to see what it tells and what question it asks. Decide what two steps you should take to answer the question, and write A, S, M, or D for each step. Then find the answer.

1. Sue's brother Joe has a part-time job. He works 14 hours each week and earns 85¢ an hour. How much money will he earn in 4 weeks?

Do you see that you must multiply twice to find the answer?

Step 1. Multiply $14 \times 85¢$ to find how much Joe earns each week.

Step 2. Multiply the answer to Step 1 by 4 to find how much Joe would earn in 4 weeks.

$$\begin{array}{r} \$.85 \\ \times 14 \\ \hline 3\,40 \\ 8\,5 \\ \hline \$11.90 \end{array} \qquad \begin{array}{r} \$11.90 \\ \times 4 \\ \hline \$47.60 \end{array}$$

2. In a school auditorium there are 25 rows of seats with 14 seats in a row. If all of the regular seats and 19 extra chairs are filled, how many persons are present?

3. Dick's grandfather sold 15 dozen eggs at 79¢ a dozen and some chickens for \$9.75. How much money did he receive for the eggs and the chickens?

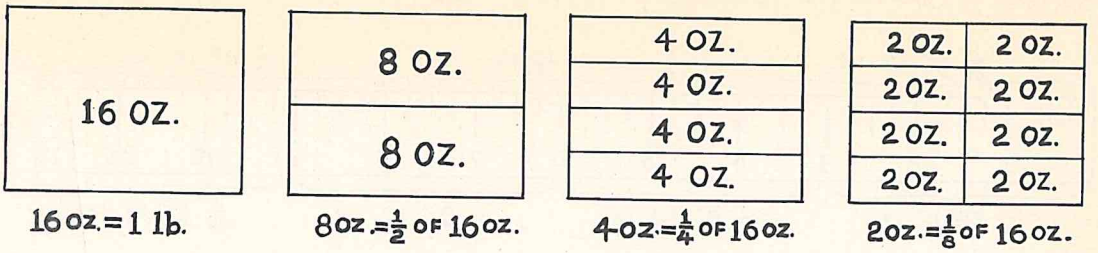
4. Mr. Campbell bought 3 gallons of oil for his car. What did he pay for it if the oil was priced at 35¢ a quart?

5. A grocer paid \$10.80 for 9 bags of potatoes. He sold them at \$2.00 a bag. How much profit did he make?

6. Fred had 65¢ and earned 50¢ running errands. How much more money does he need to buy a baseball glove that costs \$1.60?

7. Alice has filled a 24-page stamp album. She put 36 stamps on each page. How many stamps would be needed to fill 3 such albums?

8. Julie bought a box of crayons for 18¢ and some drawing paper for 35¢. How much change should she get from \$1.00?



16 oz. = 1 lb. 8 oz. = $\frac{1}{2}$ of 16 oz. 4 oz. = $\frac{1}{4}$ of 16 oz. 2 oz. = $\frac{1}{8}$ of 16 oz.

Comparing the Denominators of Fractions

The illustration above shows 4 pounds of butter. The first pound (lb.) is not divided. One pound equals 16 ounces (oz.).

1. Into how many equal parts is the second pound divided? Each part is equal to what fraction of a pound?

2. The third pound is divided into how many equal parts? Each part is equal to what fraction of a pound?

3. Into how many equal parts is the fourth pound divided? Each part is equal to what fraction of a pound?

You know that the *denominator* of a fraction tells you into how many equal parts a whole thing has been divided. You can see that the *fewer* equal parts into which a whole thing is divided, the *larger* each part will be.

4. $\frac{1}{2}$ of a pound is more than $\frac{1}{4}$ of a pound because 8 ounces is more than 4 ounces.

5. Why is $\frac{1}{2}$ of a pound more than $\frac{1}{8}$ of a pound?

6. Why is $\frac{1}{4}$ of a pound more than $\frac{1}{8}$ of a pound?

7. $\frac{3}{4}$ of a pound is more than $\frac{3}{8}$ of a pound because 12 ounces is more than 6 ounces.

When fractions have *like numerators*, then the *smaller* the *denominator* is, the *larger* the *fractional part* will be.

Tell which fractional part will be larger. Then find both fractional parts and check your answer.

8. $\frac{1}{2}$ or $\frac{1}{4}$ of 20 cents.

9. $\frac{1}{6}$ or $\frac{1}{3}$ of 18 books.

10. $\frac{1}{3}$ or $\frac{1}{4}$ of 36 flowers.

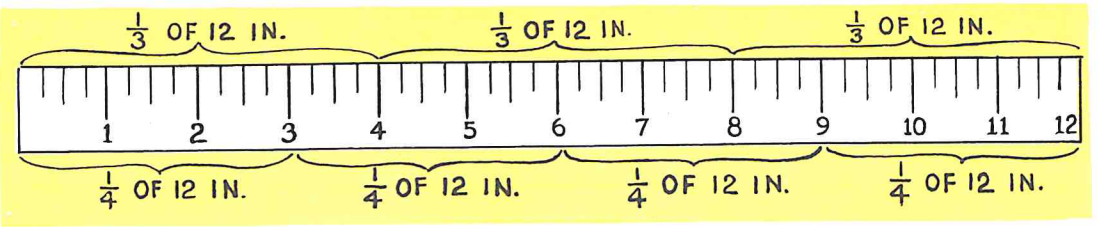
11. $\frac{3}{5}$ or $\frac{3}{4}$ of $40.

12. $\frac{3}{8}$ or $\frac{3}{4}$ of 24 pencils.

13. $\frac{1}{9}$ or $\frac{1}{8}$ of 72¢.

14. $\frac{1}{2}$ or $\frac{1}{8}$ of 16 apples.

15. $\frac{5}{6}$ or $\frac{5}{8}$ of 24 plants.



Comparing the Numerators of Fractions

Study the picture above. Then answer the questions below.

1. $\frac{1}{3}$ of 12 inches = ? inches. $\frac{2}{3}$ of 12 inches = ? inches. Which fractional part is larger: $\frac{1}{3}$ of 12 inches or $\frac{2}{3}$ of 12 inches?

2. $\frac{1}{4}$ of 12 inches = ? inches. $\frac{2}{4}$ of 12 inches = ? inches. $\frac{3}{4}$ of 12 inches = ? inches. Which fractional part is larger: $\frac{1}{4}$ of 12 inches, $\frac{2}{4}$ of 12 inches, or $\frac{3}{4}$ of 12 inches?

Have you discovered that when fractions have *like denominators*, then the *larger* the *numerator* is, the *larger* the *fractional part* will be?

Which fractional part will be larger? Find both fractional parts and check your answer:

3. $\frac{1}{3}$ or $\frac{2}{3}$ of 18 eggs.

4. $\frac{3}{5}$ or $\frac{4}{5}$ of 45 pints.

5. $\frac{5}{6}$ or $\frac{3}{6}$ of 30¢.

6. $\frac{3}{8}$ or $\frac{7}{8}$ of 96 tons.

7. $\frac{1}{4}$ or $\frac{3}{4}$ of 28 inches.

8. $\frac{2}{9}$ or $\frac{8}{9}$ of 99 feet.

9. $\frac{2}{7}$, $\frac{6}{7}$, or $\frac{4}{7}$ of 84 yards.

Find these fractional parts:

10. $\frac{1}{3}$ and $\frac{2}{3}$ of 27, 36, 54.

11. $\frac{2}{5}$ and $\frac{3}{5}$ of 40, 55, 80.

12. $\frac{1}{4}$ and $\frac{3}{4}$ of 48, 60, 76.

13. $\frac{1}{6}$ and $\frac{5}{6}$ of 36, 54, 90.

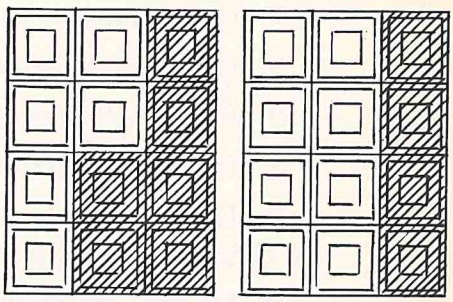
14. $\frac{1}{8}$, $\frac{5}{8}$, and $\frac{7}{8}$ of 32, 64, 88.

Now you have learned:

- When fractions have *like numerators*, then the smaller the denominator is, the larger the fractional part will be.
- When fractions have *like denominators*, then the larger the numerator is, the larger the fractional part will be.

Solving Problems

In most of the problems on this page you can answer the first question by comparing the fractions. To answer the second question, you will have to find the fractional parts. Read each problem very carefully, so that you will understand what it tells you and what you are asked to find.



1. Billy and Steve each had a candy bar like those in the picture. Billy ate $\frac{1}{2}$ of his and Steve ate $\frac{1}{3}$ of his. Which boy ate more?

How many squares of candy did each boy have left?

2. Janet and Sue each took 50 Christmas Seals to sell. Janet has sold $\frac{3}{5}$ of hers. Sue has sold $\frac{4}{5}$ of hers. Which girl has sold the larger number of seals? How many has each girl sold?

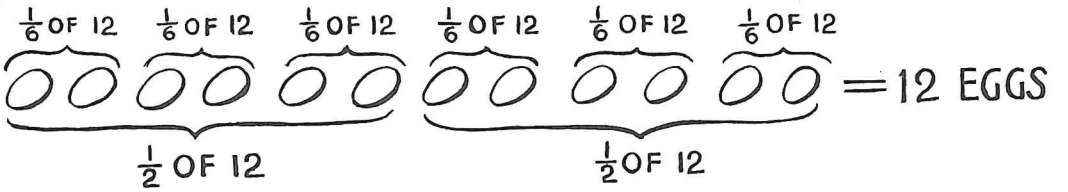
3. John and Jim each had 24 stamps. John still has $\frac{7}{8}$ of his and Jim has $\frac{5}{8}$ of his. Who has the larger number of stamps? How many stamps does each boy still have?

4. If John had $\frac{5}{8}$ of his stamps and Jim had $\frac{5}{6}$ of his, which boy would have the larger number of stamps? How many would each boy have?

5. Mrs. Hansen baked a cake and some cookies. She used $\frac{1}{4}$ of a pound of butter for the cake and $\frac{1}{8}$ of a pound for the cookies. Did she use more butter for the cookies or for the cake? How many ounces of butter did she use for each?

6. David's father bought 4 dozen tulip bulbs. He planted $\frac{1}{2}$ of them in front of the house and $\frac{1}{4}$ of them at the side of the house. Where did he plant the larger number of bulbs? How many bulbs did he have left?

7. Ethel's mother made a dozen cupcakes. Jim ate $\frac{1}{6}$ of them and Roger ate $\frac{1}{3}$ of them. Which boy ate more? How many cupcakes were left?



Comparing Equal Fractions

Study the picture above. Then answer these questions:

1. How many eggs equal $\frac{1}{6}$ of 12 eggs?

2. How many eggs equal $\frac{1}{2}$ of 12 eggs?

3. Is $\frac{1}{2}$ of 12 eggs 3 times as many eggs as $\frac{1}{6}$ of 12 eggs?

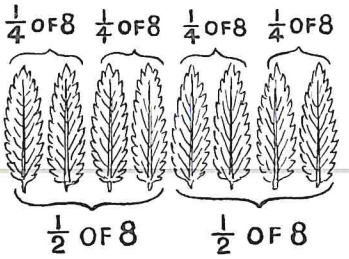
4. Is $\frac{3}{6}$ of 12 eggs equal to $\frac{1}{2}$ of 12 eggs?

5. Do you see that $\frac{3}{6}$ of any group or thing is equal to $\frac{1}{2}$ of that same group or thing?

6. Do you see that we can change $\frac{3}{6}$ to $\frac{1}{2}$ as shown at the right? We divide both terms of $\frac{3}{6}$ by 3.

$$\frac{3 \div 3}{6 \div 3} = \frac{1}{2} \text{ so } \frac{3}{6} = \frac{1}{2}$$

When we divide both terms of any fraction by the same number, the new fraction is equal to the first one. Both fractions have the same value.



7. Study the picture at the left. Do you see that $\frac{2}{4}$ of 8 = $\frac{1}{2}$ of 8? To change $\frac{2}{4}$ to $\frac{1}{2}$, divide both terms of $\frac{2}{4}$ by 2.

Find the missing numbers:

8. $\frac{2}{4} = \frac{?}{2}$ $\quad \frac{4}{8} = \frac{?}{2}$ $\quad \frac{3}{9} = \frac{?}{3}$ $\quad \frac{2}{10} = \frac{?}{5}$

Prove each of the following:

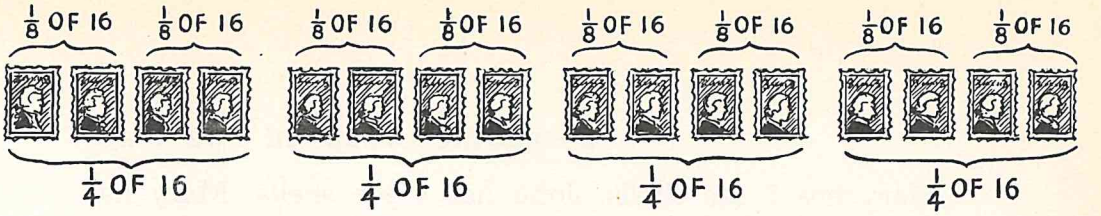
9. $\frac{3}{6}$ of 18 = $\frac{1}{2}$ of 18 $\quad \frac{2}{4}$ of 12 = $\frac{1}{2}$ of 12 $\quad \frac{4}{8}$ of 16 = $\frac{1}{2}$ of 16

10. $\frac{3}{6}$ of 24 = $\frac{1}{2}$ of 24 $\quad \frac{2}{4}$ of 28 = $\frac{1}{2}$ of 28 $\quad \frac{4}{8}$ of 32 = $\frac{1}{2}$ of 32

11. $\frac{4}{8}$ of 48 = $\frac{1}{2}$ of 48 $\quad \frac{3}{9}$ of 36 = $\frac{1}{3}$ of 36 $\quad \frac{6}{9}$ of 54 = $\frac{2}{3}$ of 54

Now you have learned:

Fractions like $\frac{3}{6}$ and $\frac{1}{2}$ are called *equal fractions* because both fractions have the same value.



Reducing Fractions to Lowest Terms

Study the picture above. Then answer these questions:

1. How many stamps are equal to $\frac{1}{8}$ of 16 stamps?

2. How many stamps are equal to $\frac{1}{4}$ of 16 stamps?

3. Do you see that $\frac{1}{4}$ of 16 stamps are 2 times as many as $\frac{1}{8}$ of 16 stamps?

4. Do you see that $\frac{1}{4}$ of 16 stamps are equal to $\frac{2}{8}$ of 16 stamps?

5. Do you see that $\frac{2}{8}$ of any group or thing is equal to $\frac{1}{4}$ of that same group or thing?

6. Do you see that we can change $\frac{2}{8}$ to $\frac{1}{4}$ as shown at the right? We divide both terms of the fraction $\frac{2}{8}$ by 2.

$$\frac{2 \div 2}{8 \div 2} = \frac{1}{4} \text{ so } \frac{2}{8} = \frac{1}{4}$$

You can see that 2 is the largest number by which both terms of $\frac{2}{8}$ can be evenly divided.

When 1 is the only number by which both terms of a fraction can be evenly divided, we say that such a fraction is in its *lowest terms*. $\frac{1}{4}$, $\frac{2}{3}$, or $\frac{5}{6}$ are in their lowest terms.

7. Which of the fractions below are in lowest terms?

$\frac{2}{4}$ $\frac{1}{3}$ $\frac{3}{5}$ $\frac{2}{6}$ $\frac{7}{8}$ $\frac{4}{8}$ $\frac{5}{6}$ $\frac{1}{8}$ $\frac{6}{12}$ $\frac{9}{12}$ $\frac{3}{8}$ $\frac{6}{8}$

Reduce each of these fractions to its lowest terms:

8. $\frac{3}{9}$ $\frac{2}{8}$ $\frac{4}{6}$ $\frac{3}{6}$ $\frac{3}{12}$ $\frac{5}{10}$ $\frac{4}{16}$ $\frac{5}{15}$ $\frac{4}{12}$ $\frac{8}{12}$ $\frac{2}{16}$ $\frac{6}{12}$

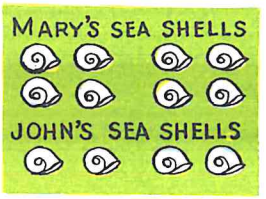
9. $\frac{2}{4}$ $\frac{6}{8}$ $\frac{4}{8}$ $\frac{6}{9}$ $\frac{8}{10}$ $\frac{9}{12}$ $\frac{4}{10}$ $\frac{8}{16}$ $\frac{2}{12}$ $\frac{6}{16}$ $\frac{14}{16}$ $\frac{2}{10}$

Now you have learned:

◐ To reduce a fraction to its *lowest terms*, you divide both terms of the fraction by the largest number you can use to divide them both evenly.

Comparing Groups in Two Ways

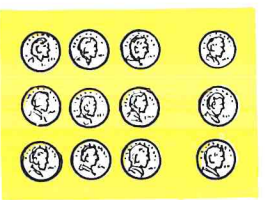
Mary has 8 sea shells. John has 4 sea shells. Mary has divided her 8 shells into 2 equal groups. Answer these questions about the groups of shells.



1. Does Mary have 2 times as many shells as John has? How can you prove that this is true? (Does $8 = 2 \times 4$?)

2. Are John's shells equal to $\frac{1}{2}$ of Mary's shells? Can you prove this? (Does $\frac{1}{2}$ of $8 = 4$?)

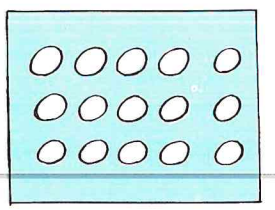
3. There are two ways you can compare Mary's 8 shells with John's 4 shells. Tell how you can compare them.



Ray spent 9¢ for a notebook and 3¢ for a pencil. Answer these questions about the money Ray spent.

4. Did Ray spend 3 times as much for the notebook as he spent for the pencil? How can you prove that this is true?

5. Did what Ray spent for the pencil equal $\frac{1}{3}$ of what he spent for the notebook? How can you prove this?



Joe found 12 eggs. Susan found 3.

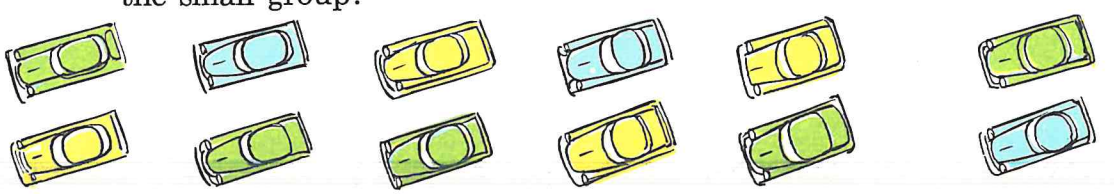
6. Did Joe find 4 times as many eggs as Susan found? (Does $12 = 4 \times 3$?)

7. The eggs Susan found were equal to what fraction of the eggs Joe found? (Does $\frac{1}{4}$ of $12 = 3$?)

8. Homer has 25¢. Jerry has 5¢. Prove that Homer has 5 times as much money as Jerry. Prove that Jerry has $\frac{1}{5}$ as much money as Homer.

9. Dan has 35¢. Tom has 7¢. Dan has how many times as much money as Tom? Tom's money is equal to what fraction of Dan's?

10. How many times larger is one of the two groups below than the other? What fraction of the large group is equal to the small group?



Solving Problems

Decide what each problem tells you and what question it asks. Then write A, S, M, or D to show what you will do to answer the problem question. Then find the answer.

1. Harvey delivers 85 papers a week. How many papers will he deliver in 15 weeks?

2. The boys on the baseball team can buy uniforms at $9.98 each. How much will 9 uniforms cost?

3. Dick bought 5 stamp packets at 35¢ each. How much change should he receive from $2.00?

4. The milkman left 72 bottles of milk for the children. The boys delivered 19 bottles to the first grade, 17 bottles to the second grade, and 21 bottles to the third grade. How many bottles did they have left?

5. A freight train traveled at an average speed of 39 miles an hour for 12 hours. How far did it go?

6. Mr. Beyer drives his car at an average of 15 miles to a gallon of gasoline. At this rate, how far can he drive on a tankful of gas if the tank holds 18 gallons?

7. Four persons agreed to share equally the expenses of a trip to the city. The expenses were, bus fare $1.80, movie tickets $1.60, and food $3.24. How much should each pay?

8. A farmer put 26 bags of feed on his truck. Each bag weighs 98 pounds. How much did the truckload of feed weigh?

9. Joan's older brother earns 80¢ an hour. He works 3 hours a day. How much will he earn in 20 days?

10. Find the cost of 2 quarts of ice cream at 55¢ a quart and a cake at 75¢.

11. Dorothy and Mary bought a pound of candy for 40¢. Each paid $\frac{1}{2}$ of the cost. How much did each girl pay?

12. Barbara and Tom each want to save 50¢ to buy a birthday gift for their mother. Barbara has saved $\frac{3}{5}$ of 50¢ and Tom has saved $\frac{2}{5}$ of 50¢. How much have they saved in all?

Review and Practice

Find the answers for the examples and problems below. Watch the signs. Check your answers.

1.

54	$5.08	7)779	$12.35	76
28	−.39		×6	−28
62				
47		73	$86.50	
+35	6)$4.92	×29	−9.75	3)$9.69

2.

89	$1.89	8)984	$43.29	4)$84.60
×7	2.50		×8	
	8.75			
	5.06	902	600	
7)98	+4.25	−357	−513	$.05)$78.25

3.

92	$1.05	2)597	$38.26	4)809
−8	×6		10.40	
			98.79	
	$8.75	768	50.00	$3.25
4)317	−2.48	×9	+27.98	×7

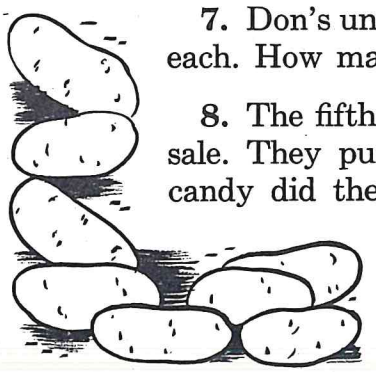
4.

99	325	2)6819	$54.06	4)$6.80
×72	4723		−25.39	
	6			
	79	$2.49	$87.69	
3)603	+5847	×4	×5	$.02)$69.71

5. $\frac{6}{8} = \frac{?}{4}$ $\frac{3}{6} = \frac{?}{2}$ $\frac{6}{9} = \frac{?}{3}$ $\frac{2}{4} = \frac{?}{2}$ $\frac{9}{12} = \frac{?}{4}$ $\frac{8}{10} = \frac{?}{5}$

6. Write the larger fraction in each pair below.

$\frac{1}{3}$ or $\frac{1}{4}$ $\frac{1}{2}$ or $\frac{1}{3}$ $\frac{1}{8}$ or $\frac{1}{5}$ $\frac{5}{7}$ or $\frac{4}{7}$ $\frac{3}{5}$ or $\frac{4}{5}$



7. Don's uncle sold 35 bags of potatoes weighing 60 pounds each. How many pounds of potatoes did he sell?

8. The fifth grade made 200 pieces of candy for the candy sale. They put 5 pieces into each bag. How many bags of candy did they have?

To Help You Remember

The numbers after the questions are page numbers that tell you where to turn if you need help.

▶ *To think and talk about:*

1. What two steps do you take to find the average of 10, 12, 15, and 11? (53)

2. What do the numerator and the denominator of the fraction $\frac{2}{3}$ tell you? (43)

3. Which is more, $\frac{1}{3}$ of 12 inches or $\frac{1}{4}$ of 12 inches? (103)

4. Which is larger, $\frac{1}{8}$ of a pound or $\frac{3}{8}$ of a pound? (104)

5. Explain how you would reduce $\frac{3}{6}$ to its lowest terms. (107)

6. In what two ways can you compare 3 and 15? (108)

▶ *To think about and write:*

1. Write each pair of fractions that are equal. (106)

$\frac{2}{4}$ and $\frac{1}{2}$ $\frac{2}{3}$ and $\frac{1}{3}$ $\frac{6}{8}$ and $\frac{3}{4}$ $\frac{1}{3}$ and $\frac{1}{2}$ $\frac{4}{6}$ and $\frac{2}{3}$ $\frac{6}{9}$ and $\frac{3}{9}$

2. Reduce these fractions to their lowest terms. (107)

$\frac{6}{8}$ $\frac{4}{6}$ $\frac{2}{4}$ $\frac{3}{6}$ $\frac{2}{8}$ $\frac{6}{9}$ $\frac{4}{8}$ $\frac{3}{9}$ $\frac{2}{6}$

3. Write the smaller fraction in each pair below. (103-104)

$\frac{1}{2}$ or $\frac{1}{3}$ $\frac{1}{2}$ or $\frac{1}{4}$ $\frac{1}{3}$ or $\frac{1}{5}$ $\frac{1}{8}$ or $\frac{1}{7}$ $\frac{2}{5}$ or $\frac{3}{5}$ $\frac{5}{7}$ or $\frac{3}{7}$ $\frac{3}{8}$ or $\frac{5}{8}$

Find the answers. Watch the signs.

4. $3\overline{)6850}$ (86) 5. $\$25.84 \times 5$ (82) 6. $\$.25 \times 92$ (99) 7. $4\overline{)\$27.40}$ (87)

8. $\$46.04 - \$19.87 = ?$ (71) 9. $4657 + 9 + 328 = ?$ (68)

Robert ate 6 cookies and Susan ate 2 cookies. Compare the number of cookies Robert ate with the number Susan ate. Copy the sentences below and fill the blanks. (108)

10. Robert ate _____ times as many cookies as Susan.

11. Susan ate _____ as many cookies as Robert.

Testing Yourself

Find the answers for the examples and problems below. Watch the signs. Check your answers.

1.

88 42 36 57 +76	$6\overline{)845}$ \$9.00 −.54	$4\overline{)\$3.56}$ 635 ×5	84 −56 \$54.80 −5.95	\$14.75 ×5 $4\overline{)\$8.48}$

2.

$8\overline{)96}$ 32 ×75	\$3.20 6.54 2.98 4.75 +8.40	$7\overline{)861}$ 300 −264	$\$.03\overline{)\$41.01}$ $6\overline{)\$95.04}$	\$65.22 ×3 801 −522

3.

$6\overline{)530}$ 56 −9	84 ×62 \$5.95 −2.67	53 ×29 $3\overline{)476}$	\$12.67 65.25 32.68 20.04 +27.50	\$6.45 ×6 $5\overline{)729}$

4.

$4\overline{)804}$ 75 ×6	$3\overline{)\$7.56}$ \$3.65 ×8	384 67 4792 8 +5460	$\$.04\overline{)\$48.72}$ $3\overline{)\$38.47}$	\$68.40 −23.75 \$75.80 ×9

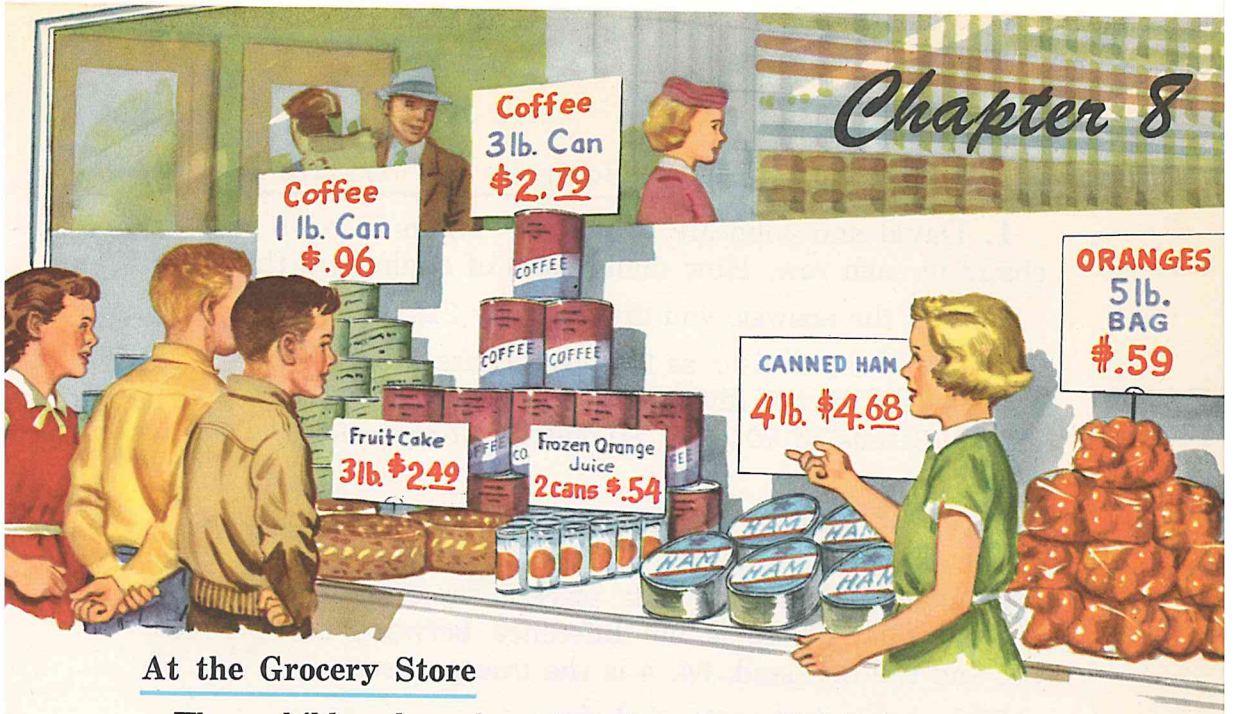
5. $\frac{2}{6} = \frac{?}{3}$ $\frac{2}{8} = \frac{?}{4}$ $\frac{2}{4} = \frac{?}{2}$ $\frac{3}{9} = \frac{?}{3}$ $\frac{4}{8} = \frac{?}{2}$ $\frac{4}{6} = \frac{?}{3}$

6. Which is smaller, $\frac{1}{2}$ or $\frac{1}{4}$? $\frac{1}{5}$ or $\frac{1}{6}$? $\frac{3}{5}$ or $\frac{2}{5}$? $\frac{2}{7}$ or $\frac{3}{7}$?

7. A grocer sold 68 cases of peas with 24 cans in a case. How many cans of peas did he sell?

8. A grocer paid 2¢ for each empty pop bottle. One day he paid out \$1.24 for empty bottles. How many empty bottles did he get?

9. Mrs. Kelly bought 4 folding chairs at \$5.75 each. How much change should she receive from \$25.00?



At the Grocery Store

These children have been learning about division at school. Now they are finding the cost per pound or per can of some of the articles displayed in the grocery store window.

1. What is the cost of the fruit cake per pound?

2. At the price given, what would 1 can of frozen orange juice cost?

3. How much cheaper per pound is the coffee in the 3-pound can than in the 1-pound can?

4. What is the cost per pound of the canned ham?

5. What is the cost per pound of a 5-pound bag of oranges? (If you cannot find the exact cost, find the cost to the nearest cent.)

Find the answers and check them:

6. $5\overline{)400}$ $7\overline{)352}$ $9\overline{)819}$ $6\overline{)426}$ $7\overline{)498}$ $6\overline{)369}$ $6\overline{)548}$

7. $9\overline{)504}$ $6\overline{)375}$ $7\overline{)602}$ $8\overline{)464}$ $9\overline{)748}$ $6\overline{)499}$ $7\overline{)457}$

8. $7\overline{)770}$ $3\overline{)693}$ $4\overline{)848}$ $6\overline{)965}$ $2\overline{)908}$ $8\overline{)976}$ $6\overline{)742}$

9. $3\overline{)1836}$ $7\overline{)2179}$ $4\overline{)2684}$ $7\overline{)6900}$ $8\overline{)7000}$ $9\overline{)8429}$

Dividing by a Two-Place Divisor

1. David and John are to place 84 chairs in rows with 21 chairs in each row. How many rows of chairs will there be?

To find the answer, you divide 84 by 21.

Think of the divisor as 21 ones. There are not enough tens in the dividend to divide by 21, so change 8 tens to 80 ones. 80 ones + 4 ones = 84 ones.

$$21\overline{)84}\quad 4,\ 84$$

Divide 84 ones by 21 ones. To find the quotient divide 8 in the dividend by 2 in the divisor. Think, $8 = 4 \times 2$. 4 is the *trial quotient.* Write 4 in ones' place in the quotient. *Multiply.* $4 \times 21 = 84$. There is no difference between the product, 84, and the dividend, 84. 4 is the *true quotient.*

The answer is 4 rows of chairs.

2. Study the example at the right. There are no ones in the dividend or in the divisor. This example is worked like the example above.

$$10\overline{)30}\quad 3,\ 30$$

Divide 30 ones by 10 ones. To find the trial quotient, divide the 3 in the dividend by the 1 in the divisor. Think $3 = 3 \times 1$. The *trial quotient* is 3. *Multiply.* $3 \times 10 = 30$. There is no difference between the product, 30, and the dividend 30. 3 is also the *true quotient.*

Copy these division examples and divide:

3.	$90\overline{)90}$	$20\overline{)60}$	$40\overline{)80}$	$30\overline{)90}$	$20\overline{)40}$	$30\overline{)60}$	$50\overline{)50}$
4.	$11\overline{)22}$	$12\overline{)48}$	$13\overline{)39}$	$14\overline{)28}$	$22\overline{)66}$	$41\overline{)82}$	$24\overline{)48}$
5.	$21\overline{)42}$	$33\overline{)66}$	$42\overline{)84}$	$11\overline{)88}$	$23\overline{)69}$	$13\overline{)26}$	$12\overline{)36}$
6.	$23\overline{)46}$	$11\overline{)55}$	$21\overline{)84}$	$22\overline{)44}$	$34\overline{)68}$	$32\overline{)96}$	$43\overline{)86}$

Now you have learned:

When the divisor and the dividend are both two-place numbers, divide the first figure of the dividend by the first figure of the divisor to find the *trial quotient.*

More about Two-Place Divisors

1. In some examples the first figure of the dividend cannot be divided evenly by the first figure of the divisor. Study the division in the example at the right.

$$\begin{array}{r} 3 \\ 24\overline{)72} \\ \underline{72} \end{array}$$

Divide 72 ones by 24 ones. To find the quotient think: $7 = 3 \times 2$, r 1. The *trial quotient* is 3. Write 3 in ones' place in the quotient. *Multiply.* $3 \times 24 = 72$. The product, 72, is equal to the dividend, 72, so 3 is also the *true quotient.*

In the example above, you had to multiply to tell whether or not your *trial quotient* was the *true quotient.* If you learn to *multiply mentally*, without writing figures, you can divide by two-place divisors more easily and quickly.

Here is a way to multiply that will help you:

- To find the product of 3×13, think: 3×1 ten $= 3$ tens $= 30$. $3 \times 3 = 9$. $30 + 9 = 39$. So $3 \times 13 = 39$.
- To find the product of 2×26, think: 2×2 tens $= 4$ tens $= 40$. $2 \times 6 = 12$. $40 + 12 = 52$. So $2 \times 26 = 52$.
- To find the product of 8×16, think: 8×1 ten $= 8$ tens $= 80$. $8 \times 6 = 48$. $80 + 48 = 128$. So $8 \times 16 = 128$.
- To find the product of 7×92, think: 7×9 tens $= 63$ tens $= 630$. $7 \times 2 = 14$. $630 + 14 = 644$. So $7 \times 92 = 644$.

For each row below multiply mentally and write the product. Then write each example and find the answer. When you multiplied mentally did you get correct answers?

2.	2×12	2×13	3×12	4×20	3×21	3×32
3.	3×15	4×14	5×16	2×35	3×24	2×46
4.	9×14	8×19	7×17	9×19	8×14	6×18
5.	6×29	8×59	9×39	7×47	4×89	8×46
6.	5×32	4×56	8×54	9×36	7×24	3×72

Trial Quotients and True Quotients

Find the answer for each example in rows 1 and 2 below. Before you write a quotient figure, multiply mentally to find whether your trial quotient is the true quotient.

1. $23\overline{)92}$ $35\overline{)70}$ $26\overline{)52}$ $27\overline{)54}$ $28\overline{)56}$ $36\overline{)72}$ $24\overline{)96}$

2. $46\overline{)92}$ $25\overline{)75}$ $24\overline{)72}$ $25\overline{)50}$ $26\overline{)78}$ $29\overline{)58}$ $37\overline{)74}$

Often the first trial quotient is not the true quotient. Then you try the next smaller number.

In the example shown at the right you will find that you get 6 as a trial quotient when you divide 6 by 1. But when you multiply mentally you find that $6 \times 13 = 78$. 78 is larger than the dividend so you know that 6 is too large to be the true quotient. Try 5. $5 \times 13 = 65$, which is equal to the dividend. So you know that 5 is the true quotient.

$$\begin{array}{r} 5 \\ 13\overline{)65} \\ \underline{65} \end{array}$$

Find the true quotients for the examples in rows 3 and 4.

3. $12\overline{)96}$ $15\overline{)45}$ $13\overline{)78}$ $14\overline{)42}$ $15\overline{)30}$ $13\overline{)52}$ $16\overline{)48}$

4. $18\overline{)36}$ $14\overline{)56}$ $27\overline{)81}$ $12\overline{)72}$ $29\overline{)87}$ $12\overline{)60}$ $15\overline{)75}$

In the example at the right, you get 7 as a trial quotient. Multiplying mentally, you find that $7 \times 14 = 98$, which is larger than the dividend 70. Try 6. $6 \times 14 = 84$, which is larger than 70. Try 5. $5 \times 14 = 70$. Why is 5 the true quotient?

$$\begin{array}{r} 5 \\ 14\overline{)70} \\ \underline{70} \end{array}$$

Find the true quotients for the examples below.

5. $13\overline{)91}$ $14\overline{)84}$ $17\overline{)51}$ $15\overline{)60}$ $19\overline{)57}$ $16\overline{)64}$ $18\overline{)54}$

6. $17\overline{)68}$ $16\overline{)80}$ $19\overline{)95}$ $15\overline{)90}$ $18\overline{)72}$ $28\overline{)84}$ $17\overline{)85}$

Now you have learned:

- When the *trial quotient* is too large, keep trying the next smaller numbers until you find the *true quotient.*

Dividing Money

1. Betty has \$.50 to spend for pop corn. How many \$.10 bags of pop corn can she buy?

Study the example. Both the divisor and the dividend stand for money. You divide as with other numbers. The quotient is not a money number.

$$\begin{array}{r} 5 \\ \$.10\overline{)\$.50} \\ \underline{50} \end{array} = \begin{array}{r} 5 \\ 10\overline{)50} \\ \underline{50} \end{array}$$

Betty can buy 5 bags of pop corn.

2. When Bill helped at the store, he sold 20 cookies for \$.40. What was the price of each cooky?

In this example the dividend stands for money. The divisor is an ordinary number. The quotient also stands for money because it tells the price of each cooky. Notice that the dollar sign and cents point are in their correct places in the quotient. What was the price of each cooky?

$$\begin{array}{r} \$.02 \\ 20\overline{)\$.40} \\ \underline{40} \end{array}$$

Find the answers for the examples below. Be sure to use the dollar sign and cents point correctly.

3.	\$.23)\$.69	\$.41)\$.82	\$.27)\$.54	\$.22)\$.88	\$.20)\$.40
4.	\$.31)\$.62	\$.11)\$.44	\$.36)\$.72	\$.42)\$.84	\$.32)\$.64
5.	11)\$.33	16)\$.16	13)\$.26	11)\$.55	25)\$.75
6.	14)\$.28	11)\$.77	30)\$.90	12)\$.24	15)\$.30

Remainders in Division

1. Roy has 97 stamps. He plans to put them in his book with 31 stamps on a page. How many pages will he fill and how many stamps will be left?

Think of the divisor as 31 ones. There are not enough tens in the dividend to divide by 31, so change 9 tens to 90 ones. 90 ones + 7 ones = 97 ones.

$$\begin{array}{r} 3\ \text{r}4 \\ 31\overline{)97} \\ \underline{93} \\ 4 \end{array} \qquad \text{Check:} \quad \begin{array}{r} 31 \\ \times 3 \\ \hline 93 \\ +4 \\ \hline 97 \end{array}$$

Divide 97 ones by 31 ones. To find the trial quotient, think $9 = 3 \times 3$. The trial quotient is 3. *Multiply.* $3 \times 31 = 93$. *Subtract.* $97 - 93 = 4$. 4 is the remainder. You know that 3 is the true quotient because the remainder, 4, is less than the divisor, 31.

To check, multiply the divisor by the quotient and add the remainder. The sum should equal the dividend. Find and check the answers for the examples in rows 2, 3, and 4.

2. $11\overline{)24}$ $50\overline{)58}$ $12\overline{)26}$ $20\overline{)47}$ $13\overline{)29}$ $40\overline{)83}$ $22\overline{)68}$

3. $44\overline{)89}$ $10\overline{)65}$ $34\overline{)69}$ $20\overline{)85}$ $31\overline{)99}$ $70\overline{)78}$ $42\overline{)87}$

4. $25\overline{)57}$ $38\overline{)77}$ $26\overline{)58}$ $30\overline{)66}$ $27\overline{)58}$ $49\overline{)99}$ $37\overline{)79}$

In the examples below, the trial quotient is not the true quotient. Keep trying the next smaller numbers until you find the true quotient. Find and check each answer:

5. $12\overline{)75}$ $13\overline{)54}$ $14\overline{)48}$ $15\overline{)35}$ $19\overline{)39}$ $16\overline{)37}$ $18\overline{)38}$

6. $14\overline{)78}$ $16\overline{)69}$ $17\overline{)54}$ $14\overline{)85}$ $13\overline{)95}$ $15\overline{)67}$ $19\overline{)59}$

Sometimes the remainder is very large, but it is still smaller than the divisor. Work these examples with large remainders and check your answers.

$$\begin{array}{r} 1\ \text{r}13 \\ 15\overline{)28} \\ \underline{15} \\ 13 \end{array}$$

7. $22\overline{)80}$ $14\overline{)27}$ $33\overline{)91}$ $15\overline{)58}$ $13\overline{)75}$

Problems to Solve

For each problem, or for each step in two-step problems, write A, S, M, or D to show whether you will add, subtract, multiply, or divide to find the answer. Then find the answer for the question the problem asks.

1. John knows that a bushel of oats weighs 32 pounds. How many bushels can be filled from a 65-pound bag of oats and how many pounds will be left?

2. Sally made 36 cookies to share equally among 15 children. How many cookies can she give each child and how many will she have left?

3. Betty had $1.30. She spent $.50 for cloth and used the balance to buy ribbon at $.15 a yard. How many yards did she buy and how many cents did she have left?

Step 1. Subtract $.50 from $1.30.
Step 2. Divide what is left by $.15.

4. Betty's mother baked 80 cookies and kept 35 of them for the family. She divided the rest equally among 15 children at Betty's party. How many cookies did each child get?

5. Sue knows that candy bars are packed 24 to a box. She wants 50 candy bars for her party. How many full boxes and how many extra candy bars must she buy?

6. Mr. Doyle had 250 chickens. He sold 26 chickens. Then he divided the rest of them equally among 4 pens. How many chickens did he have in each pen?

7. An airplane traveled 95 miles in 19 minutes. What was its average speed per minute?

8. A farmer had 96 eggs to put into cartons holding a dozen eggs each. How many cartons did he fill?

9. Daniel earned 15¢ on Friday evening and 35¢ on Saturday morning. He had 19¢ in his penny bank. How many tickets can he buy at 20¢ each and how many cents will be left?

10. At $2.75 an hour how much can a man earn in 8 hours?

Dividing Three-Place Numbers by Two-Place Divisors

1. Judy bought a package of 188 beads to make chains. She used 94 beads for each chain. How many chains did she make?

Answer the question by dividing. Think of the divisor as 94 ones. There are not enough hundreds to divide by 94, so change 1 hundred to 10 tens. 10 tens + 8 tens = 18 tens. There are not enough tens to divide by 94, so change 18 tens to 180 ones. 180 ones + 8 ones = 188 ones.

$$\begin{array}{r} 2 \\ 94\overline{)188} \\ \underline{188} \end{array}$$

Divide 188 ones by 94 ones. Since 1 is less than 9, divide 18 by 9 to find the trial quotient 2. Write 2 in the quotient. *Multiply*. $2 \times 94 = 188$, which equals the dividend. So you know that 2 is also the true quotient. Judy made 2 chains.

Copy these examples and divide:

2. $21\overline{)147}$ $30\overline{)150}$ $21\overline{)105}$ $73\overline{)219}$ $20\overline{)100}$ $84\overline{)168}$

3. $83\overline{)581}$ $36\overline{)108}$ $73\overline{)438}$ $46\overline{)138}$ $63\overline{)252}$ $23\overline{)115}$

The trial quotient in this example would appear to be 11. Do not use 11. Try 9. Keep trying the next smaller number until you find the true quotient.

$$\begin{array}{r} 9 \\ 19\overline{)114} \\ \underline{171} \end{array} \qquad \begin{array}{r} 6 \\ 19\overline{)114} \\ \underline{114} \end{array}$$

If you multiply mentally you will not need to write each trial quotient, or multiply on paper.

Tell how you can be sure that 6 is the true quotient.

Copy these examples and find the answers:

4. $47\overline{)423}$ $89\overline{)801}$ $56\overline{)504}$ $78\overline{)702}$ $38\overline{)304}$ $27\overline{)216}$

5. $15\overline{)120}$ $12\overline{)108}$ $14\overline{)112}$ $37\overline{)148}$ $57\overline{)114}$ $56\overline{)168}$

Now you have learned:

When the trial quotient appears to be 10 or more, first try 9. Keep trying the next smaller number, multiplying mentally, until you discover the true quotient.

Uneven Division

1. Study the example at the right below. Before you can divide you must change 1 hundred to 10 tens and 12 tens to 120 ones. Think 129 ones ÷ 30 ones = ?

Divide 129 ones by 30 ones. To find the trial quotient, divide the first two figures in the dividend by the first figure in the divisor. Think 12 = 4 × 3. 4 is the trial quotient. *Multiply.* 4 × 30 = 120. *Subtract.* 129 − 120 = 9. 4 is the true quotient because the remainder, 9, is less than the divisor, 30. The answer is 4, remainder 9.

$$\begin{array}{r} 4\text{ r }9 \\ 30\overline{)\,129} \\ \underline{120} \\ 9 \end{array}$$

Find and check the answer for each example below.

2. $42\overline{)129}$ $20\overline{)185}$ $63\overline{)128}$ $72\overline{)217}$ $83\overline{)169}$ $31\overline{)219}$

3. $31\overline{)249}$ $82\overline{)329}$ $40\overline{)205}$ $91\overline{)729}$ $72\overline{)147}$ $60\overline{)366}$

4. $92\overline{)465}$ $35\overline{)109}$ $53\overline{)319}$ $82\overline{)658}$ $23\overline{)117}$ $62\overline{)438}$

In rows 5 and 6 the trial quotient is not the true quotient and the remainders are large.

5. $28\overline{)150}$ $25\overline{)165}$ $39\overline{)246}$ $47\overline{)340}$ $38\overline{)162}$ $27\overline{)199}$

6. $27\overline{)180}$ $43\overline{)368}$ $39\overline{)219}$ $59\overline{)330}$ $37\overline{)274}$ $58\overline{)370}$

The next trial quotients appear to be 10 or more.

7. $28\overline{)256}$ $56\overline{)508}$ $25\overline{)205}$ $39\overline{)318}$ $18\overline{)130}$ $16\overline{)132}$

8. $14\overline{)115}$ $12\overline{)110}$ $17\overline{)155}$ $13\overline{)120}$ $15\overline{)116}$ $18\overline{)112}$

Below are mixed division examples for review and practice.

9. $3\overline{)20}$ $4\overline{)38}$ $3\overline{)64}$ $7\overline{)79}$ $6\overline{)84}$ $8\overline{)96}$ $5\overline{)72}$ $6\overline{)93}$

10. $3\overline{)270}$ $8\overline{)724}$ $8\overline{)590}$ $5\overline{)393}$ $6\overline{)509}$ $4\overline{)319}$ $8\overline{)700}$

11. $20\overline{)80}$ $23\overline{)69}$ $37\overline{)74}$ $47\overline{)94}$ $17\overline{)68}$ $16\overline{)80}$ $35\overline{)75}$

12. $46\overline{)184}$ $74\overline{)592}$ $38\overline{)114}$ $69\overline{)416}$ $57\overline{)288}$ $95\overline{)764}$

Problems to Solve

For each problem below write A, S, M, or D to show whether you will add, subtract, multiply, or divide. If the problem has two steps, write A, S, M, or D for each step. Then find the answer. Remember:

When you need to:	*Then do this:*
> Find how many in all	Add
> Find the difference between two numbers	Subtract
> Find how many in all of the equal groups	Multiply
> Find how many equal groups > Find how many in each equal group	Divide

1. John had \$.29 and earned \$.50. How many tickets could he buy at 25¢ each, and how many cents would be left?

2. The Johnston's car will travel 18 miles on a gallon of gasoline. How many gallons will they use in a 72-mile trip?

3. Jerry's father bought 128 pounds of oats for seed. The price was \$.96 per bushel. A bushel of oats weighs 32 pounds. What did 128 pounds of seed cost?

Step 1. Divide 128 by 32 to find the number of bushels.
Step 2. Multiply the price per bushel by the number of bushels to find the cost of 128 pounds.

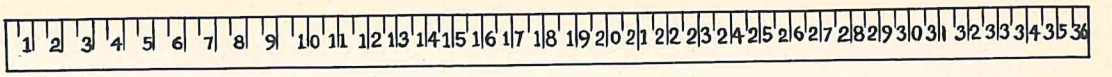
4. At 3 cans for 57¢, what will be the cost of 8 cans of orange juice?

5. Jane's father drives at an average speed of 45 miles an hour. How long will it take him to make a 90-mile trip?

6. Tom put 72 eggs into cartons that held 1 dozen eggs each. He sold the cartons of eggs for 65¢ each. How much did he get for the eggs?

7. Jim has 80¢. He wants to buy some puzzles that cost 20¢ each. How many can he buy?

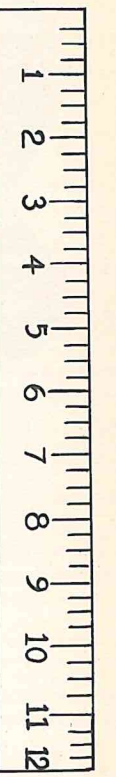
8. A store put snow suits priced at \$24.98 on sale at half price. What was the sale price?



Using Measures of Length

You know that the most commonly used measuring instruments for length are the foot ruler and the yardstick.

Use a real ruler and a real yardstick to help you answer the questions. The table for measuring length at the bottom of the page will also help you to work the problems. Find the answers to the problems below.



1. Judy's desk is 1 foot 9 inches wide. She has a blotter that is 17 inches wide on top of the desk. How much wider is the desk than the blotter?

2. Jim swam the length of a swimming pool that is 38 yards long. How many feet did Jim swim?

3. Tom is 52 inches tall. Bill is 4 feet 8 inches tall. How many inches shorter is Tom than Bill?

4. Betty has a strip of red crepe paper 20 inches wide. She wants to cut it into strips 2 inches wide. How many strips will she have?

5. Roy guessed the length of a room to be 16 yards. When he measured the room he found it was 41 feet long. How much too large was Roy's guess?

6. It is 2 miles from Helen's house to the post office. How many feet is this?

7. Esther bought 4 yards of ribbon which she cut into 18-inch lengths to use in tying gifts. How many pieces did she get?

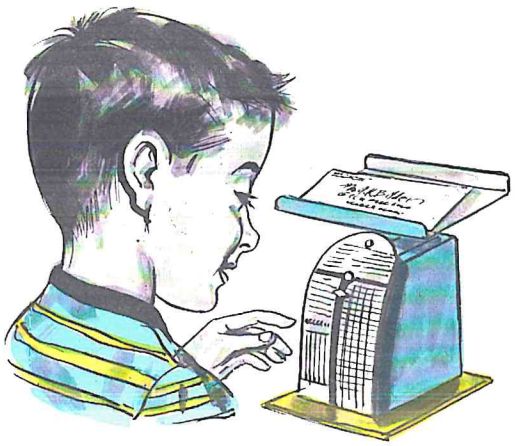
8. The girls bought 27 yards of cloth to use for making drapes. They cut the cloth into 9 equal pieces. How many feet long was each piece?

Measures of Length

12 inches (in.)	= 1 foot (ft.)	5280 ft.	= 1 mile(mi.)
3 ft.	= 1 yard (yd.)	1760 yd.	= 1 mi.
36 in.	= 1 yd.		

Using Measures of Weight

Find the answers for these problems. Use the table for measuring weight, at the bottom of the page, if you need to.



1. Jack will need a 3¢ stamp for each ounce that his letter weighs. His letter weighs 2 ounces. How much will it cost to send the letter?

2. How much less than a hundredweight is a 75-pound bag of wheat?

3. A loaded truck weighed 7984 pounds. When empty the truck weighed 4995 pounds. What was the weight of the load?

4. Janet bought $\frac{1}{2}$ of a pound of bacon. At $.78 a pound, how much must she pay for the bacon?

5. John's father bought a load of coal that weighed 2 tons. How many pounds of coal were on the truck?

6. Bob caught a fish that weighed 1 pound 5 ounces. Sam caught a fish that weighed $\frac{3}{4}$ of a pound. How much heavier was Bob's fish than Sam's?

7. Bill's father can haul $\frac{1}{2}$ of a ton of feed on his trailer each trip. How many pounds can he haul in 3 trips?

8. Nancy bought candy bars that weighed 2 ounces each. How many candy bars must she buy to get 1 pound of candy?

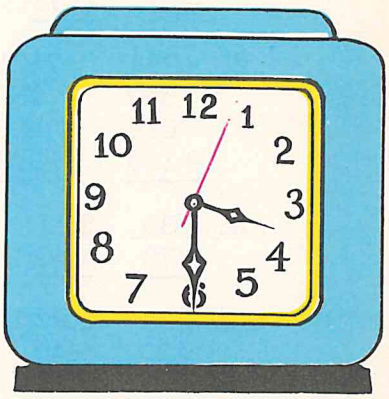
9. A farmer sold a 400-pound calf at $21.85 a cwt. How much money should he receive? (400 lb. = 4 cwt.)

Measures of Weight

16 ounces (oz.) = 1 pound (lb.)
2000 lb. = 1 ton (T.)
100 lb. = 1 hundredweight (cwt.)

Using Measures of Time

The extra hand on the clock below is called a sweep second hand. It travels all the way around the clock in 60 seconds.



1. What time does the clock show?

2. How many times will the second hand travel around the face of the clock in 5 minutes?

Use a calendar, and the table for measuring time which you see at the bottom of this page, to help you answer the following questions:

3. Ray ran around the school track in 1 minute and 3 seconds. Bob ran the same distance in 55 seconds. How much less time did it take Bob than Ray to run around the track?

4. Betty plans to save 5¢ a day for each day in October. How much money will she have saved at the end of the month?

5. John's father works 8 hours a day. At $2.25 an hour, how much does he earn in a week of 5 days?

6. Bill's father starts work at 8 a.m. and stops at 5 p.m. He takes 1 hour for lunch. How many hours does he work a day?

7. Janet practices piano $\frac{1}{2}$ hour each morning and $\frac{3}{4}$ hour each afternoon. How many minutes does she practice each day?

8. How many weeks are there in 1 year and 84 days?

9. Which months have 30 days? 31 days? 28 or 29 days?

10. Jerry is to meet his father at the station at 4:52. It is now 3:20. How long is it before Jerry is to meet his father?

Measures of Time

60 seconds (sec.)	= 1 minute (min.)	365 da.	= 1 year (yr.)
60 min.	= 1 hour (hr.)	366 da.	= 1 leap yr.
24 hr.	= 1 day (da.)	52 wk.	= 1 yr.
7 da.	= 1 week (wk.)	12 mo.	= 1 yr.

Review and Practice

Work the examples in each row. Watch the signs.

1.

135	300	5641	6782	9023	$72.00	$85.23
−87	−153	−672	−2839	−3846	−9.48	−36.49

2.

234	7401	3003	$3.29	$ 6.00	$25.25
590	960	5500	5.10	1.09	50.00
678	805	6060	2.98	3.59	17.50
+100	+999	+4987	+7.50	+90.90	+62.75

3.

$.30	$.17	$.25	$.33	$.60	$.14	$.75	$.80
×20	×40	×23	×24	×50	×70	×25	×22

4.

$.39	$.87	$.83	$.27	$.74	$.56	$.36	$.95
×20	×40	×21	×36	×62	×48	×31	×44

5. $6\overline{)58}$ $3\overline{)62}$ $5\overline{)545}$ $4\overline{)363}$ $6\overline{)649}$ $7\overline{)352}$ $8\overline{)6430}$

6. $20\overline{)60}$ $42\overline{)84}$ $35\overline{)70}$ $49\overline{)98}$ $15\overline{)30}$ $19\overline{)76}$ $17\overline{)51}$

7. $30\overline{)65}$ $40\overline{)86}$ $35\overline{)105}$ $16\overline{)128}$ $52\overline{)265}$ $44\overline{)340}$

Solve these problems:

8. Lucy made 60 cookies for a party. There were 15 girls at the party. How many cookies could she serve to each girl?

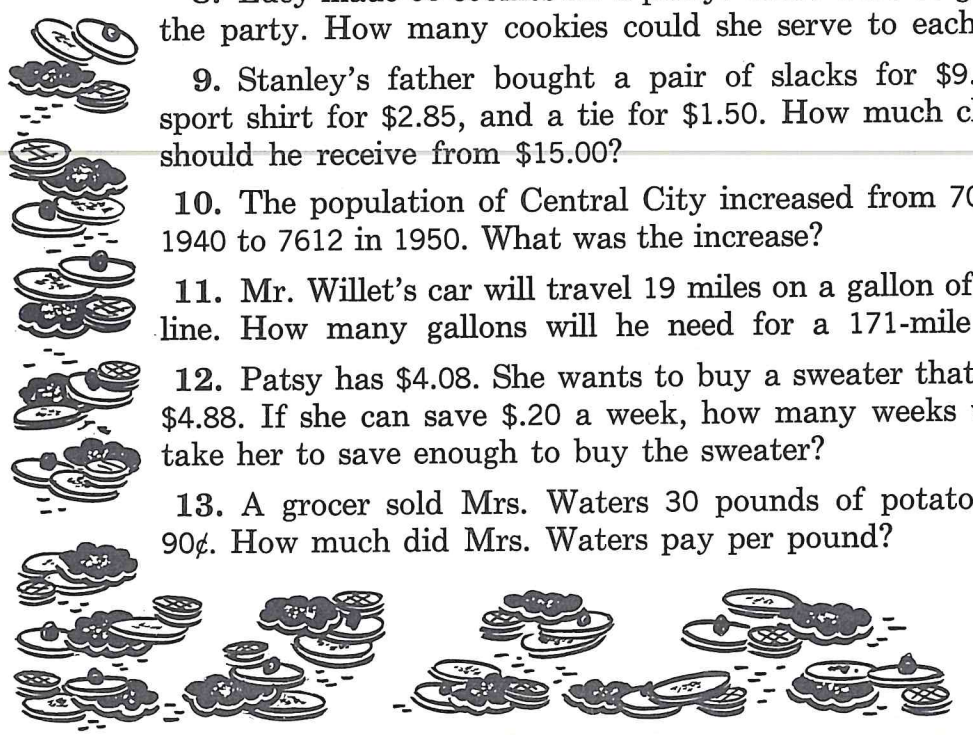
9. Stanley's father bought a pair of slacks for $9.88, a sport shirt for $2.85, and a tie for $1.50. How much change should he receive from $15.00?

10. The population of Central City increased from 7095 in 1940 to 7612 in 1950. What was the increase?

11. Mr. Willet's car will travel 19 miles on a gallon of gasoline. How many gallons will he need for a 171-mile trip?

12. Patsy has $4.08. She wants to buy a sweater that costs $4.88. If she can save $.20 a week, how many weeks will it take her to save enough to buy the sweater?

13. A grocer sold Mrs. Waters 30 pounds of potatoes for 90¢. How much did Mrs. Waters pay per pound?



To Help You Remember

The page numbers after the questions and examples on this page tell you where to turn for help if you need it.

▶ *To think and talk about:*

1. In example A, 6 is a trial quotient. Is it also the true quotient? If not, what is the true quotient? (116)

2. Explain how you would check the answer in example B. (118)

3. Why will the answer in example C be a one-place number? (120)

4. How do you prove that trial quotients 9, 8, and 7 are too large for example D? What is the true quotient? (120)

5. What short way can you use to multiply in example E? (88)

6. What short way can you use to multiply in example F? (88)

7. Tell how to multiply mentally to find the answers for 2×13; 5×16; 8×14; and 4×97. (115)

A $13\overline{)65}$ (quotient 6)

B $31\overline{)97}$ (quotient 3 r4; 93; 4)

C $94\overline{)188}$

D $19\overline{)114}$

E 95×40

F 70×80

▶ *To think about and write:*

1. Write the table for measuring time. (125)

2. Write the table for measuring length. (123)

3. Write the table for measuring weight. (124)

Find the answers for these examples:

4. $3650 + 4250$ (68)

5. $7320 - 5079$ (71)

6. 42×8 (35)

7. 356×4 (36)

8. 7560×6 (81)

9. 30×20 (88)

10. 24×30 (90)

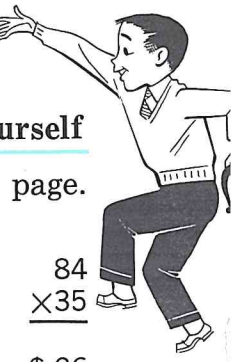
11. 38×25 (91)

12. $4\overline{)360}$ (52)

13. $7\overline{)4568}$ (86)

14. $29\overline{)261}$ (120)

15. $16\overline{)115}$ (121)



Testing Yourself

Find the answer for each of the examples on this page. Watch the signs.

1.

37	224	6570	$38.25	50	94	84
×4	×8	×4	×3	×24	×24	×35

2.

$.40	$.38	$.55	$.75	$.98	$.84	$.62	$.26
×62	×44	×47	×23	×25	×30	×76	×43

3.

38	4000	3726	$4.85	$ 8.60	$68.00
196	987	4589	3.27	25.87	14.25
37	326	9103	.87	6.23	37.43
+792	+6904	+7564	+5.96	+9.84	+19.65

4.

650	311	9780	8724	$59.25	$45.00
−97	−186	−795	−3785	−9.67	−38.94

5. $8\overline{)67}$ $4\overline{)86}$ $6\overline{)366}$ $7\overline{)493}$ $5\overline{)537}$ $9\overline{)8130}$ $5\overline{)4525}$

6. $12\overline{)48}$ $13\overline{)26}$ $47\overline{)94}$ $14\overline{)84}$ $29\overline{)59}$ $12\overline{)67}$ $15\overline{)91}$

7. $15\overline{)120}$ $50\overline{)408}$ $42\overline{)127}$ $75\overline{)600}$ $89\overline{)4000}$ $16\overline{)125}$

Solve these problems:

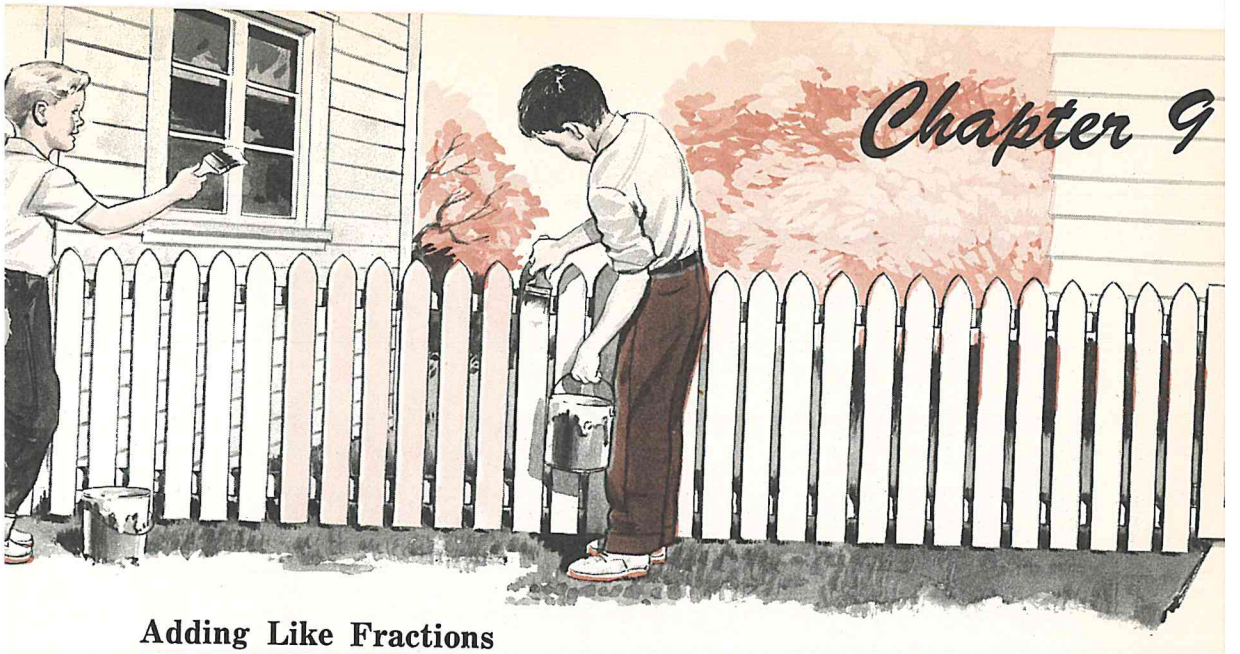
8. The 266 children in one school planned a picnic. If 38 children ride in each bus, how many buses are needed?

9. Mr. Brown bought 15 gallons of gasoline at $.31 a gallon. How much change should he receive from $5.00?

10. The girls bought 3 yards of ribbon to tie notebook covers. They needed a 14-inch piece for each notebook. How many pieces can they get and how long a piece will be left?

11. William earned $.30 on Monday, $.45 on Tuesday, and $.20 on Wednesday. If he spends the money to buy 10-cent savings stamps, how many can he buy and how much money will he have left?

12. If butter costs $.94 a pound, how much should Mary Lou pay for $\frac{1}{2}$ of a pound?



Chapter 9

Adding Like Fractions

1. Mark has painted $\frac{1}{5}$ of the fence in his back yard. His older brother has painted $\frac{3}{5}$ of the fence. What fraction of the fence have they painted?

To find what fraction of the fence the boys have painted, you add $\frac{1}{5}$ and $\frac{3}{5}$. The denominators in the two fractions are alike. Fractions with the same denominators are *like fractions.*

$\frac{1}{5} + \frac{3}{5} = \frac{?}{5}$

We can add like fractions just as we add like numbers.

1 one		1	1 ten		10	1 fifth		$\frac{1}{5}$
+3 ones	or	+3	+3 tens	or	+30	+3 fifths	or	$\frac{3}{5}$
4 ones		4	4 tens		40	4 fifths		$\frac{4}{5}$

To add like fractions we add the numerators. $\frac{1}{5} + \frac{3}{5} = \frac{4}{5}$

2. Which pairs of fractions below are like fractions?

$\frac{2}{9}$ and $\frac{5}{9}$ $\quad$ $\frac{3}{4}$ and $\frac{3}{8}$ $\quad$ $\frac{4}{7}$ and $\frac{6}{7}$ $\quad$ $\frac{2}{5}$ and $\frac{3}{5}$ $\quad$ $\frac{1}{2}$ and $\frac{2}{3}$

3. Find the sums of these pairs of like fractions:

$\frac{1}{3} + \frac{1}{3}$ $\quad$ $\frac{2}{5} + \frac{1}{5}$ $\quad$ $\frac{4}{9} + \frac{1}{9}$ $\quad$ $\frac{2}{7} + \frac{1}{7}$ $\quad$ $\frac{1}{9} + \frac{7}{9}$

Now you have learned:

- To add *like fractions, add* the *numerators.*

More Addition of Like Fractions

Add these like fractions:

1.	$\frac{1}{3}$	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{2}{5}$	$\frac{2}{7}$	$\frac{1}{7}$	$\frac{2}{7}$	$\frac{1}{7}$	$\frac{4}{7}$	$\frac{1}{9}$	$\frac{1}{7}$
	$\frac{1}{3}$	$\frac{1}{5}$	$\frac{2}{5}$	$\frac{3}{5}$	$\frac{2}{5}$	$\frac{3}{7}$	$\frac{1}{7}$	$\frac{1}{7}$	$\frac{3}{7}$	$\frac{1}{7}$	$\frac{4}{9}$	$\frac{5}{7}$
2.	$\frac{3}{7}$	$\frac{2}{7}$	$\frac{3}{5}$	$\frac{2}{7}$	$\frac{3}{7}$	$\frac{1}{9}$	$\frac{4}{9}$	$\frac{1}{9}$	$\frac{2}{5}$	$\frac{2}{9}$	$\frac{5}{9}$	$\frac{4}{9}$
	$\frac{2}{7}$	$\frac{4}{7}$	$\frac{1}{5}$	$\frac{2}{7}$	$\frac{3}{7}$	$\frac{1}{9}$	$\frac{1}{9}$	$\frac{7}{9}$	$\frac{1}{5}$	$\frac{2}{9}$	$\frac{2}{9}$	$\frac{4}{9}$

To add three like fractions, add the numerators.

3.	$\frac{1}{4}$	$\frac{1}{7}$	$\frac{2}{5}$	$\frac{1}{9}$	$\frac{2}{9}$	$\frac{1}{9}$	$\frac{1}{7}$	$\frac{1}{7}$	$\frac{3}{8}$	$\frac{4}{7}$	$\frac{5}{9}$	$\frac{1}{5}$
	$\frac{1}{4}$	$\frac{3}{7}$	$\frac{1}{5}$	$\frac{2}{9}$	$\frac{2}{9}$	$\frac{4}{9}$	$\frac{2}{7}$	$\frac{3}{7}$	$\frac{1}{8}$	$\frac{1}{7}$	$\frac{2}{9}$	$\frac{1}{5}$
	$\frac{1}{4}$	$\frac{2}{7}$	$\frac{1}{5}$	$\frac{4}{9}$	$\frac{4}{9}$	$\frac{2}{9}$	$\frac{2}{7}$	$\frac{1}{7}$	$\frac{1}{8}$	$\frac{1}{7}$	$\frac{1}{9}$	$\frac{1}{5}$

Solve these problems:

4. Betty used $\frac{1}{3}$ of a yard of ribbon and Jane used $\frac{1}{3}$ of a yard of ribbon from the same spool. What fraction of a yard of ribbon did the two girls use? How many inches of ribbon did they use?

5. Janet walks $\frac{1}{5}$ of a mile to get to Betty's house and another $\frac{3}{5}$ of a mile from Betty's house to school. What fraction of a mile does she walk in all?

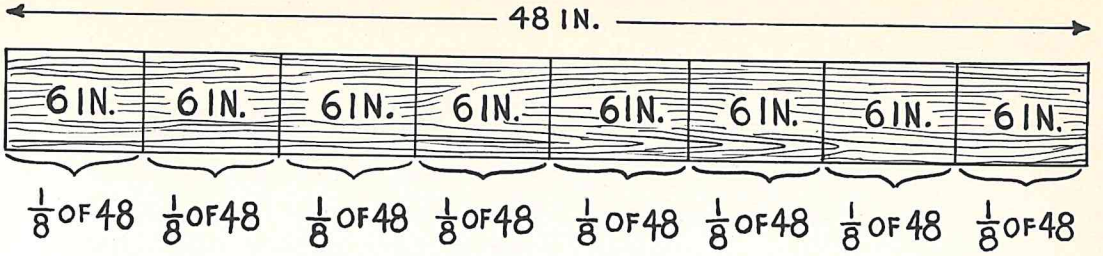
6. Jack bought candy as follows: peanut brittle, $\frac{1}{4}$ lb.; peppermint, $\frac{1}{4}$ lb.; orange slices, $\frac{1}{4}$ lb. What fraction of a pound of candy did he buy? How many ounces did he have?

7. Bob spent $\frac{2}{5}$ of a dollar for a movie and $\frac{1}{5}$ of a dollar for a soda. What fraction of a dollar did he spend?

8. Eva bought $\frac{1}{3}$ of a yard of blue ribbon and $\frac{1}{3}$ of a yard of red ribbon. At 39¢ a yard how much did the ribbon cost?

9. Helen bought $\frac{4}{9}$ of a yard of white cloth and $\frac{1}{9}$ of a yard of red cloth to use in making a doll dress. What fraction of a yard of cloth did she buy in all?

10. John spent $\frac{2}{7}$ of his weekly allowance on Monday, $\frac{3}{7}$ of it on Tuesday and $\frac{1}{7}$ of it on Wednesday. What fraction of his weekly allowance had he spent in those 3 days?



Reducing Sums to Lowest Terms

1. Ralph used $\frac{1}{8}$ of a board in making a toy and $\frac{3}{8}$ of it in building a birdhouse. What fraction of the board did he use in all?

To find how many in all, we add. The fractions $\frac{1}{8}$ and $\frac{3}{8}$ are like fractions. We add the numerators to find the sum.

$$\begin{array}{r} \frac{1}{8} \\ +\frac{3}{8} \\ \hline \frac{4}{8} = \frac{1}{2} \end{array}$$

What part of the board did Ralph use?

The answer to the problem is $\frac{4}{8}$, but it is not in lowest terms. What do you think should be done?

2. By what number do you divide both terms of $\frac{4}{8}$ to reduce it to lowest terms? (See page 107)

3. How do you know that $\frac{1}{2}$ is in lowest terms?

4. If the board was 48 inches long, how many inches of the board did Ralph use in making the toy?

5. How many inches of board did he use for the birdhouse?

6. How many inches of the board did he use altogether?

7. Reduce these fractions to lowest terms:

$\frac{2}{4} = ?$ $\frac{2}{6} = ?$ $\frac{3}{6} = ?$ $\frac{4}{6} = ?$ $\frac{2}{8} = ?$ $\frac{4}{8} = ?$ $\frac{3}{9} = ?$

Add these fractions. Reduce the sums to lowest terms:

8.

$\frac{1}{4}$	$\frac{1}{6}$	$\frac{1}{8}$	$\frac{5}{8}$	$\frac{3}{8}$	$\frac{1}{9}$	$\frac{1}{15}$	$\frac{3}{16}$	$\frac{2}{9}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{3}{10}$
$\frac{1}{4}$	$\frac{1}{6}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{2}{9}$	$\frac{4}{15}$	$\frac{1}{16}$	$\frac{4}{9}$	$\frac{5}{16}$	$\frac{1}{8}$	$\frac{3}{10}$

9.

$\frac{1}{9}$	$\frac{1}{10}$	$\frac{3}{16}$	$\frac{1}{12}$	$\frac{3}{10}$	$\frac{1}{12}$	$\frac{7}{10}$	$\frac{3}{16}$	$\frac{5}{12}$	$\frac{3}{16}$
$\frac{5}{9}$	$\frac{1}{10}$	$\frac{7}{16}$	$\frac{1}{12}$	$\frac{1}{10}$	$\frac{5}{12}$	$\frac{1}{10}$	$\frac{3}{16}$	$\frac{5}{12}$	$\frac{9}{16}$

10.

$\frac{7}{12}$	$\frac{1}{16}$	$\frac{5}{16}$	$\frac{1}{20}$	$\frac{1}{15}$	$\frac{5}{16}$	$\frac{7}{20}$	$\frac{5}{16}$	$\frac{3}{16}$	$\frac{1}{15}$
$\frac{1}{12}$	$\frac{1}{16}$	$\frac{9}{16}$	$\frac{3}{20}$	$\frac{2}{15}$	$\frac{1}{16}$	$\frac{3}{20}$	$\frac{7}{16}$	$\frac{5}{16}$	$\frac{8}{15}$

Fractions that Equal One

1. Lila helped her mother $\frac{1}{2}$ hour before school in the morning and $\frac{1}{2}$ hour after supper. How many hours did Lila spend helping her mother that day?

We add to find how many in all. $\frac{1}{2}$ and $\frac{1}{2}$ are like fractions, so we add the numerators.

$\frac{1}{2}$ hour
$+\frac{1}{2}$ hour
$\frac{2}{2}$ hours = 1 hour

You can prove that $\frac{1}{2}$ hour + $\frac{1}{2}$ hour = 1 hour this way: There are 30 minutes in $\frac{1}{2}$ hour. 30 minutes + 30 minutes = 60 minutes, which equal 1 hour.

2. How could you prove that $\frac{4}{4}$ hours equal 1 hour?

You can see that any whole thing, or any number, equals $\frac{2}{2}$ or $\frac{3}{3}$ or $\frac{8}{8}$ of itself. We say then that $1 = \frac{2}{2}$ or $\frac{3}{3}$ or $\frac{4}{4}$ or $\frac{7}{7}$.

3. Copy the fractions which equal 1: $\frac{6}{6}$ $\frac{5}{6}$ $\frac{3}{7}$ $\frac{7}{7}$ $\frac{4}{9}$ $\frac{5}{16}$ $\frac{16}{16}$.

Add these like fractions. Be sure that each answer is in lowest terms. Why are all the answers in row 4 the same?

4.	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{3}{4}$	$\frac{2}{5}$	$\frac{1}{6}$	$\frac{4}{7}$	$\frac{3}{8}$	$\frac{7}{9}$	$\frac{3}{10}$	$\frac{7}{12}$	$\frac{8}{15}$	$\frac{5}{16}$
	$\frac{1}{2}$	$\frac{2}{3}$	$\frac{1}{4}$	$\frac{3}{5}$	$\frac{5}{6}$	$\frac{3}{7}$	$\frac{5}{8}$	$\frac{2}{9}$	$\frac{7}{10}$	$\frac{5}{12}$	$\frac{7}{15}$	$\frac{11}{16}$
5.	$\frac{5}{12}$	$\frac{5}{9}$	$\frac{5}{8}$	$\frac{3}{10}$	$\frac{5}{6}$	$\frac{3}{5}$	$\frac{1}{7}$	$\frac{5}{8}$	$\frac{7}{12}$	$\frac{5}{9}$	$\frac{9}{16}$	$\frac{5}{7}$
	$\frac{1}{12}$	$\frac{4}{9}$	$\frac{1}{8}$	$\frac{1}{10}$	$\frac{1}{6}$	$\frac{1}{5}$	$\frac{4}{7}$	$\frac{3}{8}$	$\frac{1}{12}$	$\frac{2}{9}$	$\frac{1}{16}$	$\frac{1}{7}$
6.	$\frac{1}{5}$	$\frac{1}{3}$	$\frac{4}{7}$	$\frac{3}{8}$	$\frac{1}{5}$	$\frac{4}{9}$	$\frac{9}{16}$	$\frac{5}{12}$	$\frac{3}{10}$	$\frac{1}{15}$	$\frac{7}{16}$	$\frac{6}{20}$
	$\frac{3}{5}$	$\frac{1}{3}$	$\frac{1}{7}$	$\frac{1}{8}$	$\frac{2}{5}$	$\frac{1}{9}$	$\frac{3}{16}$	$\frac{5}{12}$	$\frac{1}{10}$	$\frac{7}{15}$	$\frac{3}{16}$	$\frac{3}{20}$
	$\frac{1}{5}$	$\frac{1}{3}$	$\frac{2}{7}$	$\frac{1}{8}$	$\frac{1}{5}$	$\frac{4}{9}$	$\frac{3}{16}$	$\frac{1}{12}$	$\frac{3}{10}$	$\frac{7}{15}$	$\frac{3}{16}$	$\frac{7}{20}$

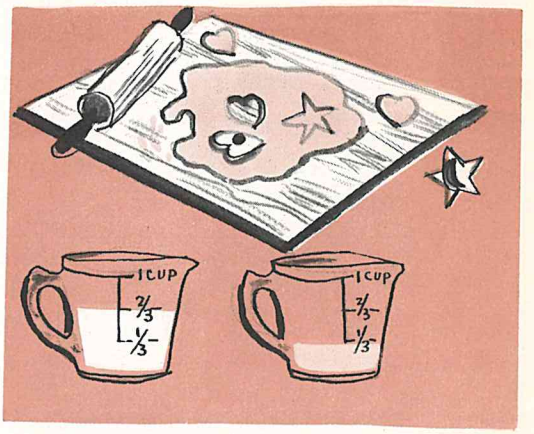
You will remember:

- When the numerator is the same as the denominator, the fraction equals 1.

Using Fractions in Solving Problems

1. Julie's mother used $\frac{2}{3}$ of a cup of white flour and $\frac{1}{3}$ of a cup of whole-wheat flour for making cookies. How many cups of flour did she use in all?

2. Nancy bought $\frac{1}{6}$ of a yard of white ribbon and $\frac{1}{6}$ of a yard of blue ribbon to use for making doll clothes. What fraction of a yard of ribbon did she buy altogether? At 12¢ a yard, how much did she pay for the ribbon?



3. Harry bought $\frac{1}{4}$ of a pound of candy. John bought $\frac{1}{4}$ of a pound of candy. What fraction of a pound of candy did the two boys buy altogether?

4. The $\frac{1}{4}$ lb. of candy Harry bought cost 40¢ a pound. The $\frac{1}{4}$ lb. John bought cost 32¢ a pound. How much did each boy pay? How much did the two boys pay altogether?

5. Betty cut off a piece of felt $\frac{5}{16}$ of an inch long, and another piece $\frac{7}{16}$ of an inch long to use in making two small letters. What fraction of an inch of felt did she use in all?

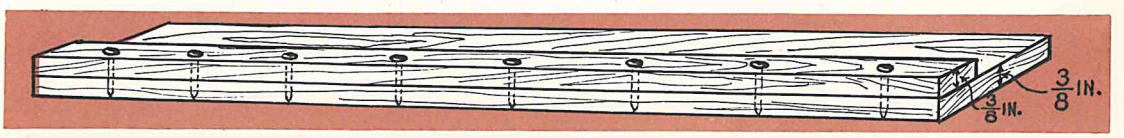
6. Doris practiced her violin lesson $\frac{1}{3}$ of an hour in the morning and $\frac{1}{3}$ of an hour in the afternoon. What fraction of an hour did she practice that day?

7. Bob walked $\frac{3}{4}$ of a mile to Tom's house and $\frac{1}{4}$ of a mile from Tom's house to Jerry's. How many miles did he walk?

8. Jane's mother bought $\frac{1}{2}$ dozen large oranges and $\frac{1}{2}$ dozen small oranges. How many dozen oranges did she buy?

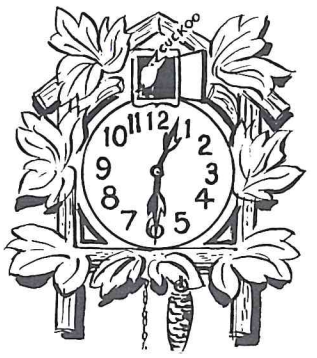
9. Jerry studied $\frac{1}{4}$ of a hour in the afternoon and $\frac{3}{4}$ of an hour in the evening. How many hours did he study that day?

10. Bill wants to nail a strip of wood $\frac{3}{8}$ of an inch thick to a piece of plywood $\frac{3}{8}$ of an inch thick. How long a nail would be equal to the thickness of the two boards together?



Understanding Proper and Improper Fractions

1. You know that $\frac{1}{2}$ of an hour is equal to $\frac{1}{2}$ of 60 minutes. You also know that $\frac{1}{2}$ of 60 minutes = 30 minutes. Tell why.



You know that $\frac{2}{2}$ of an hour = 1 hour, because 2 × 30 minutes = 60 minutes, and 60 minutes = 1 hour.

2. Why do $\frac{3}{2}$ of an hour = $1\frac{1}{2}$ hours? Why do $\frac{4}{2}$ of an hour = 2 hours?

In fractions like $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{3}{4}$ *the numerator* is *less than the denominator.* They are called *proper fractions* because they equal less than 1.

In fractions like $\frac{2}{2}$, $\frac{5}{5}$, $\frac{8}{8}$ *the numerator* is *the same as the denominator.* They are called *improper fractions* because they equal 1.

In fractions like $\frac{3}{2}$, $\frac{4}{2}$, and $\frac{7}{6}$ *the numerator* is *larger than the denominator.* They are also called *improper fractions* because they equal more than 1.

3. Which of the fractions in the row just below are called improper fractions? Tell why each is an improper fraction.

$\frac{9}{9}$ $\frac{8}{9}$ $\frac{3}{4}$ $\frac{7}{7}$ $\frac{4}{3}$ $\frac{7}{5}$ $\frac{9}{8}$ $\frac{4}{5}$ $\frac{12}{12}$ $\frac{13}{16}$ $\frac{12}{11}$ $\frac{21}{18}$

4. What are the fractions called which are not improper fractions?

Find the answer for these examples:

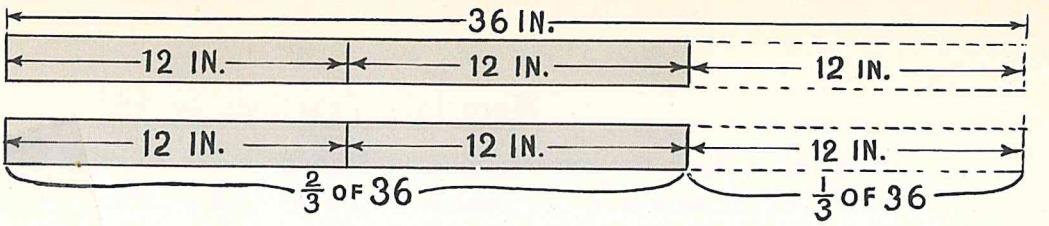
5. $\frac{2}{4} = \frac{?}{2}$ $\frac{5}{10} = \frac{1}{?}$ $\frac{2}{6} = ?$ $\frac{6}{8} = ?$ $\frac{6}{9} = ?$ $\frac{16}{16} = ?$

6. $\frac{4}{12} = ?$ $\frac{5}{15} = ?$ $\frac{9}{12} = ?$ $\frac{12}{16} = ?$ $\frac{5}{5} = ?$ $\frac{8}{16} = ?$

7. $\frac{1}{2}$ of a dozen = ? things $\frac{3}{4}$ of a pound = ? oz.

Now you have learned:

◐ Fractions that equal less than 1 are *proper fractions.* Fractions that equal 1 or more are *improper fractions.*



Improper Fractions and Mixed Numbers

1. Virginia bought $\frac{2}{3}$ of a yard of red ribbon and $\frac{2}{3}$ of a yard of green ribbon to use in tying gifts. How many yards of ribbon did she buy in all?

We add to find how many in all. $\frac{2}{3}$ and $\frac{2}{3}$ are like fractions, so we add the numerators. The sum is $\frac{4}{3}$.

$$\begin{array}{r} \frac{2}{3} \text{ yd.} \\ +\frac{2}{3} \text{ yd.} \\ \hline \frac{4}{3} \text{ yd.} = 1\frac{1}{3} \text{ yd.} \end{array}$$

2. What kind of a fraction is $\frac{4}{3}$? When the answer is an improper fraction, we change it to a whole number and a fraction, which is called a *mixed number*. $1\frac{1}{3}$ is a mixed number.

3. Look at the picture above. How many thirds of a yard of ribbon did Virginia buy? Can you prove that $\frac{4}{3}$ yd. $= 1\frac{1}{3}$ yd? How can you prove it?

To change $\frac{4}{3}$ to $1\frac{1}{3}$, think, $\frac{3}{3} = 1$. Then $\frac{4}{3} = \frac{1}{3}$ more than 1, or $1\frac{1}{3}$.

4. How would you change $\frac{3}{2}$ to a mixed number?

5. Change these improper fractions to mixed numbers.

$\frac{3}{2}$ $\frac{5}{4}$ $\frac{7}{4}$ $\frac{9}{8}$ $\frac{6}{5}$ $\frac{7}{5}$ $\frac{9}{5}$ $\frac{5}{3}$ $\frac{9}{7}$ $\frac{11}{7}$ $\frac{11}{8}$ $\frac{11}{9}$

Add these fractions. Change the sums to mixed numbers:

6. $\frac{2}{3}$ $\frac{3}{5}$ $\frac{4}{5}$ $\frac{6}{7}$ $\frac{5}{7}$ $\frac{3}{7}$ $\frac{7}{9}$ $\frac{7}{9}$ $\frac{2}{5}$ $\frac{4}{7}$
$\frac{2}{3}$ $\frac{4}{5}$ $\frac{4}{5}$ $\frac{4}{7}$ $\frac{6}{7}$ $\frac{5}{7}$ $\frac{4}{9}$ $\frac{7}{9}$ $\frac{4}{5}$ $\frac{4}{7}$

7. $\frac{6}{7}$ $\frac{5}{9}$ $\frac{5}{7}$ $\frac{3}{5}$ $\frac{8}{9}$ $\frac{6}{7}$ $\frac{8}{9}$ $\frac{5}{9}$ $\frac{6}{7}$ $\frac{4}{7}$
$\frac{3}{7}$ $\frac{5}{9}$ $\frac{5}{7}$ $\frac{3}{5}$ $\frac{2}{9}$ $\frac{2}{7}$ $\frac{8}{9}$ $\frac{8}{9}$ $\frac{6}{7}$ $\frac{5}{7}$

Now you have learned:

- A number which is made up of a *whole number and a fraction* is called a *mixed number*.

More Like Fractions to Add

1. To make a floor for his dog house, Bob nailed a piece of plywood $\frac{3}{4}$ of an inch thick to boards that were $\frac{3}{4}$ of an inch thick. How many inches thick was the floor?

To find how many in all, you add. $\frac{3}{4}$ and $\frac{3}{4}$ are like fractions, so the numerators were added. $\frac{6}{4}$ is an improper fraction, so it was changed to a mixed number, $1\frac{2}{4}$. The fraction $\frac{2}{4}$ is not in lowest terms, so it was reduced to $\frac{1}{2}$. How thick was the floor?

$$\begin{array}{r} \frac{3}{4} \text{ in.} \\ +\frac{3}{4} \text{ in.} \\ \hline \frac{6}{4} \text{ in.} = 1\frac{2}{4} \text{ in.} = 1\frac{1}{2} \text{ in.} \end{array}$$

Find each sum. Change it to a mixed number. Reduce the fraction to lowest terms.

2.

$\frac{5}{6}$	$\frac{3}{8}$	$\frac{4}{9}$	$\frac{7}{10}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{8}{9}$	$\frac{7}{9}$	$\frac{9}{10}$	$\frac{7}{10}$
$\frac{5}{6}$	$\frac{7}{8}$	$\frac{8}{9}$	$\frac{7}{10}$	$\frac{7}{8}$	$\frac{3}{4}$	$\frac{7}{9}$	$\frac{5}{9}$	$\frac{7}{10}$	$\frac{11}{10}$

3.

$\frac{7}{8}$	$\frac{11}{12}$	$\frac{11}{12}$	$\frac{9}{10}$	$\frac{7}{16}$	$\frac{4}{15}$	$\frac{9}{16}$	$\frac{3}{10}$	$\frac{9}{16}$	$\frac{5}{16}$
$\frac{7}{8}$	$\frac{5}{12}$	$\frac{7}{12}$	$\frac{9}{10}$	$\frac{11}{16}$	$\frac{14}{15}$	$\frac{9}{16}$	$\frac{9}{10}$	$\frac{11}{16}$	$\frac{13}{16}$

4.

$\frac{5}{8}$	$\frac{7}{12}$	$\frac{7}{15}$	$\frac{3}{16}$	$\frac{13}{16}$	$\frac{11}{16}$	$\frac{5}{16}$	$\frac{11}{12}$	$\frac{7}{15}$	$\frac{13}{16}$
$\frac{5}{8}$	$\frac{7}{12}$	$\frac{11}{15}$	$\frac{15}{16}$	$\frac{9}{16}$	$\frac{11}{16}$	$\frac{15}{16}$	$\frac{11}{12}$	$\frac{13}{15}$	$\frac{17}{16}$

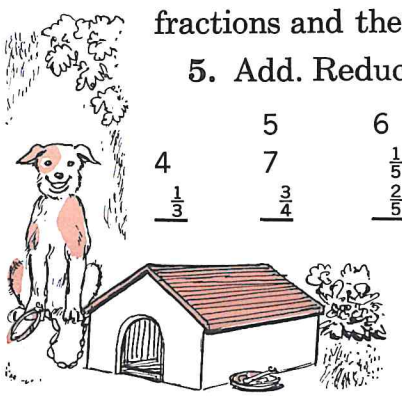
In each example below, one or more of the addends is a whole number. The fractions are written in a column to the right of the whole numbers.

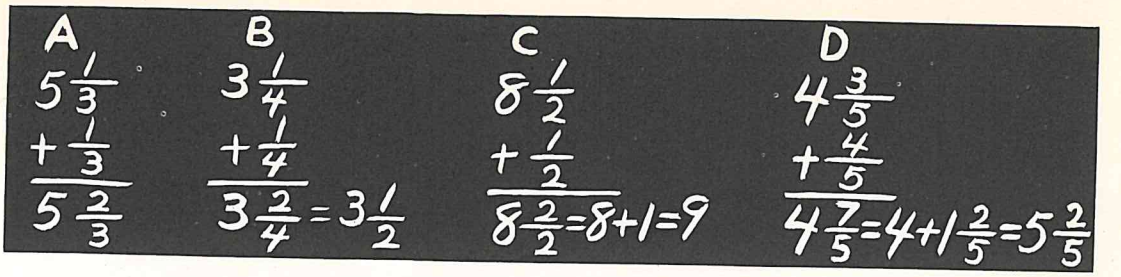
● To find the answer in example A, bring down the fraction first, and then bring down the ones. In example B, you bring down the fraction and then add the ones. In example C, you add the fractions and then bring down the ones.

A	B	C
	6	5
3	2	$\frac{1}{3}$
$+\frac{1}{2}$	$+\frac{1}{4}$	$+\frac{1}{3}$
$3\frac{1}{2}$	$8\frac{1}{4}$	$5\frac{2}{3}$

5. Add. Reduce fractions to lowest terms when you need to.

	5	6	$\frac{2}{9}$	$\frac{1}{6}$	7		2	6
4	7	$\frac{1}{5}$	8	$\frac{1}{6}$	$\frac{1}{8}$	3	3	$3\frac{1}{4}$
$\frac{1}{3}$	$\frac{3}{4}$	$\frac{2}{5}$	$\frac{4}{9}$	9	$\frac{5}{8}$	$\frac{3}{7}$	$1\frac{1}{8}$	5





Adding Fractions and Mixed Numbers

Notice that in each of the four examples shown in the picture above, one of the addends is a mixed number.

● To find the answer in example A, add the fractions first and then bring down the ones. In example B the fraction in the sum was changed to lowest terms. In example C the sum of the fractions equals 1. Add it to the ones. In example D the sum of the fractions is an improper fraction. Change it to a mixed number and add the mixed number to the ones.

Find these sums:

1.

$5\frac{1}{3}$	$1\frac{1}{9}$	$4\frac{1}{7}$	$7\frac{5}{9}$	$9\frac{1}{5}$	$6\frac{2}{7}$	$3\frac{3}{5}$	$4\frac{2}{9}$	$\frac{2}{7}$
$\frac{1}{3}$	$\frac{4}{9}$	$\frac{4}{7}$	$\frac{2}{9}$	$\frac{2}{5}$	$\frac{3}{7}$	$\frac{1}{5}$	$\frac{2}{9}$	$8\frac{1}{7}$

2.

$2\frac{1}{10}$	$2\frac{1}{6}$	$8\frac{2}{9}$	$3\frac{1}{8}$	$5\frac{1}{9}$	$7\frac{5}{8}$	$6\frac{1}{10}$	$\frac{3}{8}$	$4\frac{1}{10}$
$\frac{7}{10}$	$\frac{1}{6}$	$\frac{4}{9}$	$\frac{3}{8}$	$\frac{2}{9}$	$\frac{1}{8}$	$\frac{1}{10}$	$1\frac{3}{8}$	$\frac{3}{10}$

3.

$2\frac{1}{2}$	$5\frac{1}{3}$	$9\frac{3}{4}$	$4\frac{1}{6}$	$2\frac{4}{7}$	$8\frac{3}{5}$	$7\frac{7}{10}$	$4\frac{5}{8}$	$\frac{8}{9}$
$\frac{1}{2}$	$\frac{2}{3}$	$\frac{1}{4}$	$\frac{5}{6}$	$\frac{3}{7}$	$\frac{2}{5}$	$\frac{3}{10}$	$\frac{3}{8}$	$2\frac{1}{9}$

4.

$3\frac{3}{5}$	$6\frac{4}{7}$	$2\frac{2}{3}$	$8\frac{4}{5}$	$3\frac{7}{9}$	$9\frac{5}{7}$	$7\frac{4}{9}$	$3\frac{5}{9}$	$\frac{4}{5}$
$\frac{4}{5}$	$\frac{5}{7}$	$\frac{2}{3}$	$\frac{3}{5}$	$\frac{7}{9}$	$\frac{6}{7}$	$\frac{7}{9}$	$\frac{5}{9}$	$7\frac{3}{5}$

5.

$\frac{1}{4}$	$\frac{4}{9}$	$4\frac{1}{8}$	$8\frac{3}{10}$	$1\frac{1}{5}$	$1\frac{3}{4}$	$\frac{7}{10}$	$3\frac{2}{9}$	$\frac{4}{7}$
$3\frac{1}{4}$	$7\frac{4}{9}$	$\frac{1}{8}$	$\frac{3}{10}$	$\frac{4}{5}$	$\frac{3}{4}$	$4\frac{7}{10}$	$\frac{8}{9}$	$9\frac{6}{7}$

Solve these problems:

6. One afternoon Jack walked 1 mile, $\frac{2}{3}$ of a mile, and $\frac{2}{3}$ of a mile. How many miles did he walk in all?

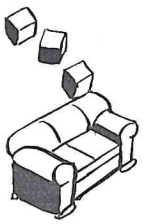
7. Ruth used $2\frac{3}{4}$ yd. of blue material and $\frac{1}{4}$ yd. of red to make aprons. How many yards of material did she use?

More about Adding Fractions and Mixed Numbers

1. Dick and his father are making some doll furniture. They need a board $4\frac{1}{8}$ inches wide and two strips, one $\frac{3}{8}$ of an inch wide and one $\frac{5}{8}$ of an inch wide. Can they cut them all from a board 6 inches wide?

This is the example to write. ⟶

$$\begin{array}{r} 4\frac{1}{8} \\ \frac{3}{8} \\ +\ \frac{5}{8} \\ \hline 4\frac{9}{8} \end{array} = 4 + 1\frac{1}{8} = 5\frac{1}{8}$$



Add the fractions and then bring down the ones. Change $\frac{9}{8}$ to a mixed number. Add the mixed number to 4. Dick and his father will use $5\frac{1}{8}$ inches of the 6-inch board.

2. Study the addition in the example at the right. To find the answer add the fractions and bring down the ones. Change $\frac{6}{4}$ to a mixed number. Add the mixed number to 5. Reduce the fraction $\frac{2}{4}$ to its lowest terms. What is the answer?

$$\begin{array}{r} \frac{3}{4} \\ +5\frac{3}{4} \\ \hline 5\frac{6}{4} \end{array} = 5 + 1\frac{2}{4} = 6\frac{2}{4} = 6\frac{1}{2}$$

Find the sums:

3.

$\frac{1}{2}$	$2\frac{1}{3}$	$4\frac{1}{6}$	$8\frac{3}{5}$	$5\frac{7}{10}$	$3\frac{5}{9}$	$7\frac{1}{12}$	$\frac{3}{8}$	$\frac{3}{7}$
$5\frac{1}{2}$	$\frac{1}{3}$	$\frac{5}{6}$	$\frac{2}{5}$	$\frac{3}{10}$	$\frac{4}{9}$	$\frac{5}{12}$	$2\frac{3}{8}$	$\frac{2}{7}$
$\frac{1}{2}$	$\frac{2}{3}$	$\frac{1}{6}$	$\frac{3}{5}$	$\frac{7}{10}$	$\frac{2}{9}$	$\frac{7}{12}$	$\frac{5}{8}$	$4\frac{5}{7}$

4.

$4\frac{5}{6}$	$1\frac{7}{8}$	$\frac{5}{8}$	$3\frac{5}{9}$	$\frac{7}{8}$	$\frac{3}{10}$	$\frac{7}{15}$	$8\frac{3}{4}$	$\frac{15}{16}$
$\frac{5}{6}$	$\frac{5}{8}$	$6\frac{5}{8}$	$\frac{7}{9}$	$2\frac{7}{8}$	$6\frac{9}{10}$	$3\frac{11}{15}$	$\frac{3}{4}$	$2\frac{5}{16}$

5.

$\frac{4}{9}$	$3\frac{3}{8}$	$4\frac{7}{10}$	$\frac{8}{9}$	$10\frac{7}{12}$	$15\frac{7}{10}$	$\frac{9}{16}$	$4\frac{9}{10}$	$1\frac{13}{15}$
$4\frac{8}{9}$	$\frac{7}{8}$	$\frac{7}{10}$	$1\frac{7}{9}$	$\frac{11}{12}$	$\frac{9}{10}$	$7\frac{9}{16}$	$\frac{9}{10}$	$\frac{7}{15}$

Solve these problems:

6. Tom worked $3\frac{1}{4}$ hours in the morning and $\frac{1}{4}$ of an hour in the afternoon. How many hours did he work?

7. George watched television $\frac{1}{4}$ hour on Friday, $1\frac{1}{4}$ hours on Saturday, and $\frac{3}{4}$ hour on Sunday. How many hours did he spend watching television during these three days?

Adding Mixed Numbers

1. In the examples below, the addends are all mixed numbers. Study each example to see how it was worked.

A $3\frac{1}{3} + 5\frac{1}{3} = 8\frac{2}{3}$

B $8\frac{1}{4} + 7\frac{1}{4} = 15\frac{2}{4} = 15\frac{1}{2}$

C $4\frac{3}{7} + 5\frac{4}{7} = 9\frac{7}{7} = 9 + 1 = 10$

D $6\frac{2}{3} + 9\frac{2}{3} = 15\frac{4}{3} = 15 + 1\frac{1}{3} = 16\frac{1}{3}$

E $2\frac{5}{8} + 2\frac{7}{8} = 4\frac{12}{8} = 4 + 1\frac{4}{8} = 5\frac{4}{8} = 5\frac{1}{2}$

2. What was done to find the answer in example A? How was the answer found in example B? In example C?

3. What kind of fraction is $\frac{4}{3}$? What kind of a fraction is $\frac{12}{8}$? Tell how examples D and E were worked.

Find the sums:

4.

$2\frac{2}{7}$	$11\frac{3}{5}$	$4\frac{1}{9}$	$6\frac{1}{5}$	$15\frac{3}{7}$	$8\frac{4}{9}$	$4\frac{2}{5}$	$8\frac{2}{7}$	$2\frac{2}{5}$
$5\frac{3}{7}$	$7\frac{1}{5}$	$10\frac{4}{9}$	$9\frac{1}{5}$	$3\frac{1}{7}$	$12\frac{4}{9}$	$6\frac{2}{5}$	$4\frac{4}{7}$	$3\frac{1}{5}$

5.

$6\frac{3}{8}$	$13\frac{1}{10}$	$19\frac{5}{9}$	$9\frac{1}{6}$	$4\frac{1}{8}$	$7\frac{5}{12}$	$6\frac{3}{10}$	$7\frac{3}{8}$	$5\frac{2}{9}$
$3\frac{1}{8}$	$2\frac{7}{10}$	$10\frac{1}{9}$	$5\frac{1}{6}$	$11\frac{5}{8}$	$4\frac{1}{12}$	$5\frac{5}{10}$	$9\frac{3}{8}$	$6\frac{4}{9}$

6.

$7\frac{1}{6}$	$5\frac{1}{3}$	$12\frac{3}{8}$	$4\frac{3}{10}$	$2\frac{7}{12}$	$8\frac{11}{15}$	$8\frac{1}{4}$	$10\frac{2}{5}$	$5\frac{5}{7}$
$9\frac{5}{6}$	$10\frac{2}{3}$	$14\frac{5}{8}$	$8\frac{7}{10}$	$9\frac{5}{12}$	$7\frac{4}{15}$	$9\frac{3}{4}$	$4\frac{3}{5}$	$9\frac{2}{7}$

7.

$3\frac{4}{5}$	$8\frac{4}{9}$	$12\frac{3}{7}$	$5\frac{7}{9}$	$13\frac{5}{7}$	$9\frac{2}{5}$	$6\frac{3}{5}$	$10\frac{2}{7}$	$7\frac{5}{9}$
$4\frac{3}{5}$	$11\frac{7}{9}$	$2\frac{6}{7}$	$4\frac{7}{9}$	$10\frac{5}{7}$	$3\frac{4}{5}$	$8\frac{3}{5}$	$1\frac{6}{7}$	$4\frac{8}{9}$

8.

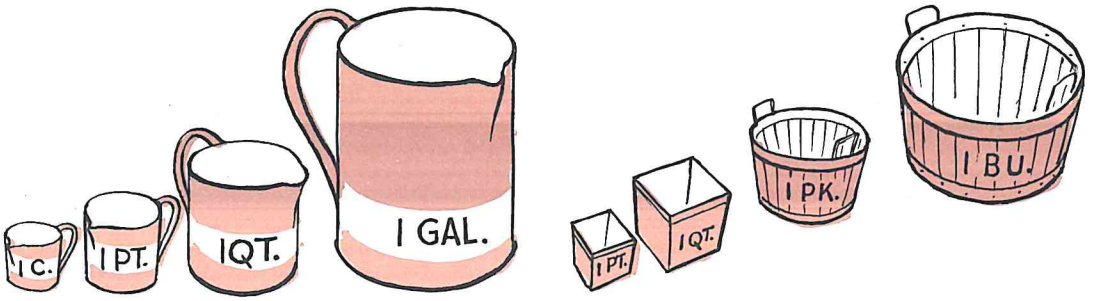
$4\frac{5}{6}$	$4\frac{7}{10}$	$10\frac{8}{9}$	$2\frac{9}{10}$	$1\frac{3}{4}$	$5\frac{11}{12}$	$14\frac{5}{8}$	$16\frac{3}{4}$	$3\frac{3}{8}$
$1\frac{5}{6}$	$6\frac{7}{10}$	$3\frac{7}{9}$	$10\frac{3}{10}$	$4\frac{3}{4}$	$8\frac{7}{12}$	$3\frac{5}{8}$	$9\frac{3}{4}$	$4\frac{7}{8}$

9.

$2\frac{2}{9}$	$3\frac{1}{15}$	$21\frac{1}{9}$	$2\frac{4}{7}$	$15\frac{2}{9}$	$4\frac{7}{10}$	$6\frac{7}{15}$	$5\frac{3}{10}$	$2\frac{7}{8}$
$3\frac{4}{9}$	$5\frac{7}{15}$	$3\frac{4}{9}$	$1\frac{2}{7}$	$3\frac{4}{9}$	$8\frac{1}{10}$	$7\frac{4}{15}$	$7\frac{9}{10}$	$1\frac{3}{8}$
$4\frac{2}{9}$	$5\frac{2}{15}$	$4\frac{4}{9}$	$7\frac{1}{7}$	$6\frac{7}{9}$	$2\frac{7}{10}$	$8\frac{9}{15}$	$8\frac{1}{10}$	$6\frac{5}{8}$

Reviewing Liquid Measure and Dry Measure

1. Study the pictures and the two tables of measures below before you start to solve the problems on this page.



Liquid Measure	Dry Measure
2 cups(c.) = 1 pint(pt.)	2 pt. = 1 qt.
2 pt. = 1 quart(qt.)	8 qt. = 1 peck(pk.)
4 qt. = 1 gallon(gal.)	4 pk. = 1 bushel(bu.)

2. Can you tell how many pints are equal to 1 gallon?

3. A quart is equal to how many cups?

4. Can you tell how many pecks are equal to $\frac{1}{2}$ bushel?

5. Can you tell how many quarts are equal to 1 bushel?

6. The girls bought $\frac{1}{2}$ gallon of ice cream in quart cartons for a picnic. How many cartons did they buy?

7. Mrs. Green bought $2\frac{1}{4}$ bushels of apples and $\frac{3}{4}$ bushels of pears. How many bushels of fruit did she buy?

8. Helen's mother bought $\frac{3}{4}$ bushels of potatoes priced at \$1.20 a bushel. How much did she pay?

9. A family uses 19 quarts of milk in a week. At 21¢ a quart, how much is the weekly milk bill?

10. When ice cream is 29¢ a pint and 55¢ a quart, how much cheaper is the quart than two pints?

11. Find the cost of 8 quarts of berries at 39¢ a quart.

Review and Practice

Find the answers for the examples and problems below. Watch the signs. Check your answers.

1.

683	248	3942	4568	$3.77	$55.00
56	785	675	3200	.95	82.95
974	567	4800	2097	4.00	4.87
+847	+209	+2691	+4763	+6.82	+96.54

2.

763	628	4900	9872	$8.67	$98.60
−94	−472	−2865	−3485	−4.82	−25.75

3.

75	784	$6.25	$50.75	$.24	$.85	$.45
×4	×8	×9	×7	−.12	×64	+.90

4. $2\overline{)62}$ $3\overline{)94}$ $5\overline{)85}$ $6\overline{)367}$ $8\overline{)896}$ $7\overline{)4964}$ $5\overline{)8470}$

5. $21\overline{)63}$ $25\overline{)75}$ $51\overline{)306}$ $4\overline{)\$8.40}$ $\$.05\overline{)\$68.45}$ $20\overline{)\$.60}$

6.

$\frac{1}{3}$	$\frac{1}{7}$	$\frac{1}{4}$	$\frac{1}{12}$	$\frac{1}{8}$	$\frac{2}{9}$	$\frac{1}{16}$	$\frac{7}{10}$	$\frac{2}{9}$
$+\frac{1}{3}$	$+\frac{3}{7}$	$+\frac{1}{4}$	$+\frac{1}{12}$	$+\frac{1}{8}$	$+\frac{1}{9}$	$+\frac{5}{16}$	$+\frac{1}{10}$	$+\frac{4}{9}$

7.

$1\frac{2}{3}$	$3\frac{2}{5}$	$7\frac{1}{8}$	$6\frac{1}{10}$	$3\frac{2}{5}$	$7\frac{2}{9}$	$8\frac{3}{4}$	$1\frac{4}{9}$
+1	$+4\frac{2}{5}$	$+2\frac{3}{8}$	$+4\frac{3}{10}$	$+4\frac{4}{5}$	$+4\frac{8}{9}$	$+2\frac{3}{4}$	$+2\frac{8}{9}$

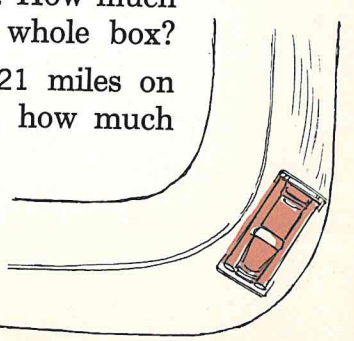
8. Judith's mother bought 12 boxes of berries at $.39 a box. How much change should she receive from $5.00?

9. John's father earns $79.50 each week. If he works 5 days a week, how much does he earn per day?

10. Mrs. Wallace paid $4.29 for a bushel of peaches and $1.07 for a bag of sugar. How much change should she get from a $10 bill?

11. Tom found that he could buy a box of 24 candy bars for $.72, or he could get single bars at $.05 each. How much can he save on each candy bar by buying a whole box?

12. Sandra's father said that his car travels 21 miles on a gallon of gasoline. If gas costs $.29 a gallon, how much will gasoline cost for a trip of 84 miles?



To Help You Remember

The page numbers after the questions on this page tell you where to turn for help if you need it.

▶ *To think and talk about:*

1. Which fraction is larger, $\frac{1}{4}$ or $\frac{1}{5}$? Why? (103)
2. Which fraction is larger, $\frac{5}{8}$ or $\frac{7}{8}$? Why? (104)
3. What are like fractions? Give examples. (129)
4. Explain how you add like fractions. (129)
5. Explain how to reduce $\frac{6}{8}$ to its lowest terms. (107)
6. When is a fraction equal to 1? (132)
7. What is the difference between a proper fraction and an improper fraction? (134)
8. What is a mixed number? (135)
9. Explain how you add mixed numbers. (139)
10. What units of measure are used in liquid measure? In dry measure? (140)

▶ *To think about and write:*

1. Arrange each pair of fractions according to size, placing the smallest fraction first. (103, 104)

$\frac{2}{5}$ and $\frac{3}{5}$ $\frac{6}{7}$ and $\frac{5}{7}$ $\frac{1}{6}$ and $\frac{1}{8}$ $\frac{2}{3}$ and $\frac{2}{5}$ $\frac{7}{8}$ and $\frac{5}{8}$

2. Find the missing numbers:

$\frac{6}{8} = \frac{?}{4}$ (107) $\frac{3}{3} = ?$ (132) $\frac{8}{5} = ?$ (135) $\frac{10}{8} = ?$ (136)

8 gal. = ? pt. 16 pt. = ? qt. 3 bu. = ? pk. 48 qt. = ? pk. (140)

Find the sums:

3. $\begin{array}{r} \frac{1}{5} \\ +\frac{2}{5} \end{array}$ (129)

4. $\begin{array}{r} \frac{1}{16} \\ +\frac{7}{16} \end{array}$ (131)

5. $\begin{array}{r} \frac{4}{5} \\ +\frac{1}{5} \end{array}$ (132)

6. $\begin{array}{r} 4\frac{3}{5} \\ +2\frac{3}{5} \end{array}$ (139)

7. $\begin{array}{r} 1\frac{3}{8} \\ +6\frac{7}{8} \end{array}$ (139)

Find the answers. Watch the signs.

8. $\begin{array}{r} 4695 \\ +7030 \end{array}$ (68)

9. $\begin{array}{r} 5630 \\ -1893 \end{array}$ (71)

10. $29\overline{)169}$ (121)

11. $\begin{array}{r} 75 \\ \times 86 \end{array}$ (100)

Testing Yourself in Working Examples

Find the answers for the examples on this page.

Add:

1.

273	428	594	627	9472	6872	$75.55
126	162	381	495	389	3745	48.67

2.

432	674	539	4462	6578	$68.75
276	28	684	389	9231	44.44
985	395	721	7650	4567	32.19
68	787	255	5164	8295	27.54

3.

$\frac{3}{10}$	$\frac{2}{9}$	$\frac{3}{7}$	$\frac{1}{8}$	$\frac{5}{6}$	$\frac{5}{12}$	$\frac{3}{16}$	$\frac{3}{4}$	$\frac{1}{5}$
$\frac{1}{10}$	$\frac{1}{9}$	$\frac{2}{7}$	$\frac{3}{8}$	$\frac{1}{6}$	$\frac{7}{12}$	$\frac{1}{16}$	$\frac{1}{4}$	$\frac{3}{5}$
$\frac{1}{10}$	$\frac{4}{9}$	$\frac{3}{7}$	$\frac{3}{8}$	$\frac{5}{6}$	$\frac{1}{12}$	$\frac{15}{16}$	$\frac{3}{4}$	$\frac{4}{5}$

4.

$1\frac{1}{8}$	$6\frac{2}{9}$	$2\frac{1}{6}$	$5\frac{4}{5}$	$4\frac{7}{8}$	$2\frac{3}{4}$	$5\frac{5}{6}$	$7\frac{1}{2}$	$3\frac{5}{9}$
$2\frac{3}{8}$	$3\frac{4}{9}$	$7\frac{1}{6}$	$2\frac{4}{5}$	$3\frac{7}{8}$	$2\frac{1}{4}$	$2\frac{1}{6}$	4	$7\frac{8}{9}$

Subtract:

5.

23	32	60	467	603	851	500
12	17	32	123	121	227	496

6.

501	800	4467	$74.25	$92.59	$86.75
124	255	2835	38.59	19.75	77.89

Multiply:

7.

243	684	3460	$2.75	$20.25	$68.85
3	5	8	6	7	9

8.

85	37	21	93	$.64	$.52	$.95
63	32	75	43	28	46	42

Divide:

9. $3\overline{)36}$ $5\overline{)52}$ $6\overline{)84}$ $4\overline{)96}$ $3\overline{)692}$ $4\overline{)876}$ $2\overline{)8750}$

10. $42\overline{)84}$ $28\overline{)56}$ $25\overline{)75}$ $24\overline{)72}$ $12\overline{)48}$ $23\overline{)46}$ $43\overline{)258}$

11. $5\overline{)\$3.25}$ $4\overline{)\$4.88}$ $6\overline{)\$28.44}$ $\$.02\overline{)\$1.40}$ $\$.05\overline{)\$38.65}$

Testing Yourself in Problem Solving

Solve these problems:

1. At an average speed of 250 miles an hour how far will an airplane travel in 9 hours?

2. John said, "In 1940 the population in our city was 29,856. The 1950 population was 31,050. How many more persons lived in our city in 1950 than in 1940?"

3. Billy said, "My father is 6 feet 1 inch tall. I am 54 inches tall." How much shorter is Billy than his father?

4. David had 96 eggs which he packed in boxes holding one dozen eggs each. How many boxes did he fill?

5. June guessed that the hallway was 120 feet long. Bob guessed that it was 45 yards long. How many yards longer was Bob's guess than June's?

6. Mr. Thompson bought 1 ton of bran, 300 pounds of ground oats, and $\frac{1}{2}$ of a ton of ground corn. How many pounds of feed did he buy?

7. Doris practiced her piano lesson for $\frac{1}{2}$ of an hour on Monday, $\frac{1}{2}$ of an hour on Tuesday, and $\frac{1}{2}$ of an hour on Wednesday. How many hours did she practice in those three days?

8. Judy bought $\frac{1}{2}$ yard of ribbon. She used a piece 12 inches long in making a doll dress. How many inches of the ribbon did she have left?

9. Esther bought $\frac{2}{3}$ yd. of white ribbon and $\frac{2}{3}$ yd. of red ribbon. How many yards of ribbon did she buy?

10. Ann bought 15 prizes for her party at 5¢ each. How much change should she get from $1.00?

11. Betty bought a bracelet for $1.29, a ring for $.85, and a necklace for $1.25. How much change should she get from a $5 bill?

12. Mrs. Wallace bought 3 boxes of peaches that had been reduced in price from $2.25 a box to $1.79 a box. How much did she save on the 3 boxes?

Chapter 10

Subtracting Like Fractions

1. Jane had $\frac{2}{3}$ of a yard of lace. She used $\frac{1}{3}$ of a yard to trim a doll dress. What fraction of a yard was left?

Subtract to find the answer. $\frac{2}{3}$ and $\frac{1}{3}$ are like fractions. You can subtract like fractions just as you subtract like numbers.

2 tens −1 ten 1 ten	or	20 −10 10	2 thirds −1 third 1 third	or	$\frac{\frac{2}{3}}{-\frac{1}{3}}$ $\frac{1}{3}$	or $\frac{2}{3} - \frac{1}{3} = \frac{1}{3}$

2. Do you see that when you subtract like fractions you subtract the numerators?

3. What fraction of a yard of lace did Jane have left?

Subtract these like fractions:

4.

$\frac{2}{5}$	$\frac{5}{7}$	$\frac{5}{7}$	$\frac{4}{5}$	$\frac{3}{7}$	$\frac{4}{7}$	$\frac{2}{9}$	$\frac{5}{9}$	$\frac{6}{7}$	$\frac{3}{5}$	$\frac{4}{7}$	$\frac{7}{9}$
$\frac{1}{5}$	$\frac{4}{7}$	$\frac{2}{7}$	$\frac{3}{5}$	$\frac{1}{7}$	$\frac{2}{7}$	$\frac{1}{9}$	$\frac{4}{9}$	$\frac{3}{7}$	$\frac{2}{5}$	$\frac{1}{7}$	$\frac{2}{9}$

Now you have learned:

- To subtract *like fractions*, *subtract* the *numerators*.

More Subtraction of Like Fractions

1. Gretchen's mother had $\frac{3}{4}$ of a cup of milk and used $\frac{1}{4}$ of a cup of milk in baking cupcakes. What fraction of the cup of milk was left?

To answer the question, you subtract like fractions. The difference is not in lowest terms. How was $\frac{2}{4}$ changed to $\frac{1}{2}$?

$$\begin{array}{r} \frac{3}{4} \text{ cup} \\ -\frac{1}{4} \text{ cup} \\ \hline \frac{2}{4} = \frac{1}{2} \text{ cup} \end{array}$$

What is the answer to the question in the problem?

Subtract and reduce each answer to lowest terms:

2.	$\frac{7}{8}$	$\frac{5}{6}$	$\frac{7}{9}$	$\frac{7}{8}$	$\frac{5}{8}$	$\frac{7}{10}$	$\frac{9}{10}$	$\frac{7}{16}$	$\frac{3}{4}$	$\frac{11}{12}$
	$\frac{3}{8}$	$\frac{1}{6}$	$\frac{1}{9}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{3}{10}$	$\frac{1}{10}$	$\frac{1}{16}$	$\frac{1}{4}$	$\frac{5}{12}$
3.	$\frac{3}{10}$	$\frac{7}{15}$	$\frac{7}{12}$	$\frac{7}{10}$	$\frac{9}{10}$	$\frac{11}{16}$	$\frac{4}{15}$	$\frac{3}{16}$	$\frac{5}{8}$	$\frac{13}{16}$
	$\frac{1}{10}$	$\frac{1}{15}$	$\frac{5}{12}$	$\frac{1}{10}$	$\frac{3}{10}$	$\frac{3}{16}$	$\frac{1}{15}$	$\frac{1}{16}$	$\frac{3}{8}$	$\frac{3}{16}$
4.	$\frac{5}{16}$	$\frac{9}{16}$	$\frac{3}{8}$	$\frac{7}{15}$	$\frac{7}{12}$	$\frac{5}{16}$	$\frac{9}{10}$	$\frac{11}{15}$	$\frac{7}{9}$	$\frac{11}{12}$
	$\frac{1}{16}$	$\frac{7}{16}$	$\frac{1}{8}$	$\frac{4}{15}$	$\frac{1}{12}$	$\frac{3}{16}$	$\frac{7}{10}$	$\frac{2}{15}$	$\frac{4}{9}$	$\frac{7}{12}$
5.	$\frac{7}{16}$	$\frac{9}{16}$	$\frac{15}{16}$	$\frac{7}{15}$	$\frac{15}{16}$	$\frac{5}{9}$	$\frac{11}{12}$	$\frac{13}{15}$	$\frac{4}{9}$	$\frac{8}{15}$
	$\frac{5}{16}$	$\frac{1}{16}$	$\frac{3}{16}$	$\frac{2}{15}$	$\frac{11}{16}$	$\frac{2}{9}$	$\frac{1}{12}$	$\frac{8}{15}$	$\frac{1}{9}$	$\frac{2}{15}$
6.	$\frac{7}{8}$	$\frac{8}{9}$	$\frac{8}{9}$	$\frac{13}{16}$	$\frac{9}{16}$	$\frac{5}{12}$	$\frac{15}{16}$	$\frac{13}{16}$	$\frac{5}{6}$	$\frac{11}{16}$
	$\frac{5}{8}$	$\frac{5}{9}$	$\frac{2}{9}$	$\frac{5}{16}$	$\frac{5}{16}$	$\frac{1}{12}$	$\frac{7}{16}$	$\frac{11}{16}$	$\frac{1}{6}$	$\frac{1}{16}$

Solve these problems:

7. John has one piece of plywood $\frac{7}{8}$ of an inch thick and another piece $\frac{5}{8}$ of an inch thick. What fraction of an inch is the difference in thickness between the two pieces?

8. John's father plans to plane $\frac{1}{16}$ of an inch from a board which is now $\frac{13}{16}$ of an inch thick. What fraction of an inch thick will the board be after he finishes?

9. Bob lives $\frac{9}{10}$ of a mile from the school. Jim lives $\frac{7}{10}$ of a mile from the school. What fraction of a mile closer to the school does Jim live than Bob?

Subtracting Fractions from Mixed Numbers

● In example A subtract the fractions. There are no ones to subtract; so bring down the 2.

● In example B there is no difference between $\frac{5}{8}$ and $\frac{5}{8}$; so we do not write anything in fractions' place in the answer. Bring down the 13.

● In example C bring down $\frac{1}{2}$ because there is no fraction in the subtrahend to subtract. There is no difference between the ones.

A	B	C
$2\frac{2}{3}$	$13\frac{5}{8}$	$4\frac{1}{2}$
$-\frac{1}{3}$	$-\frac{5}{8}$	-4
$2\frac{1}{3}$	13	$\frac{1}{2}$

Copy and subtract:

1. $6\frac{5}{7}$	$8\frac{3}{5}$	$5\frac{4}{5}$	$9\frac{6}{7}$	$4\frac{4}{5}$	$7\frac{7}{9}$	$5\frac{3}{5}$	$8\frac{3}{7}$	$3\frac{4}{5}$
$\frac{3}{7}$	$\frac{2}{5}$	$\frac{3}{5}$	$\frac{2}{7}$	$\frac{1}{5}$	$\frac{2}{9}$	$\frac{1}{5}$	$\frac{2}{7}$	$\frac{2}{5}$
2. $4\frac{2}{3}$	$6\frac{5}{6}$	$9\frac{1}{10}$	$10\frac{5}{9}$	$3\frac{6}{7}$	$5\frac{9}{14}$	$8\frac{3}{8}$	$14\frac{7}{16}$	$7\frac{1}{4}$
$\frac{2}{3}$	$\frac{5}{6}$	$\frac{1}{10}$	$\frac{5}{9}$	$\frac{6}{7}$	$\frac{9}{14}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{4}$
3. $4\frac{1}{2}$	$2\frac{3}{4}$	$8\frac{3}{5}$	$8\frac{7}{8}$	$9\frac{5}{9}$	$9\frac{7}{15}$	$4\frac{7}{9}$	$5\frac{3}{4}$	$6\frac{2}{3}$
4	2	7	6	9	4	1	2	3

Reduce the fraction in each answer to its lowest terms:

4. $4\frac{7}{8}$	$9\frac{5}{6}$	$4\frac{7}{9}$	$2\frac{5}{6}$	$6\frac{7}{10}$	$8\frac{9}{16}$	$7\frac{5}{12}$	$4\frac{5}{8}$	$5\frac{3}{8}$
$\frac{3}{8}$	$\frac{1}{6}$	$\frac{1}{9}$	$\frac{1}{6}$	$\frac{3}{10}$	$\frac{5}{16}$	$\frac{1}{12}$	$\frac{3}{8}$	$\frac{1}{8}$
5. $8\frac{9}{16}$	$6\frac{11}{12}$	$1\frac{5}{9}$	$5\frac{9}{10}$	$8\frac{13}{16}$	$13\frac{7}{16}$	$24\frac{7}{8}$	$17\frac{15}{16}$	$7\frac{11}{15}$
$\frac{7}{16}$	$\frac{5}{12}$	$\frac{2}{9}$	$\frac{3}{10}$	$\frac{5}{16}$	$\frac{3}{16}$	$\frac{1}{8}$	$\frac{5}{16}$	$\frac{1}{15}$

Solve these problems:

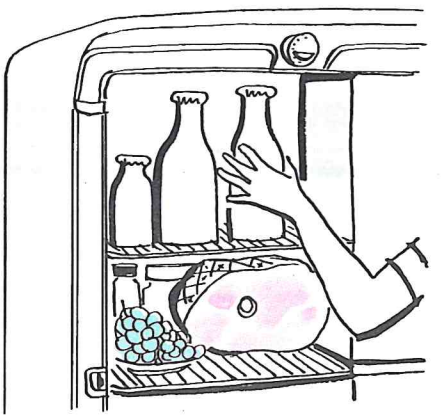
6. Mary's mother bought $3\frac{2}{3}$ yards of cloth for a dress. When she finished the dress, she had $\frac{1}{3}$ of a yard of cloth left. How many yards of cloth had she used?

7. Larry had $2\frac{1}{2}$ dozen eggs to sell. He sold 1 dozen. How many dozen eggs did he still have to sell?

8. Henry cut a $\frac{3}{8}$ inch strip from a piece of paper $10\frac{3}{8}$ inches wide. Then how wide was the piece of paper?

Subtracting Mixed Numbers

1. Study the examples for the two problems below and explain how the answer for each of the examples was found.



2. There were $2\frac{1}{2}$ quarts of milk in the refrigerator. The family drank $1\frac{1}{2}$ quarts for dinner. How many quarts were left?

$$\begin{array}{r} 2\frac{1}{2} \text{ qts.} \\ -1\frac{1}{2} \text{ qts.} \\ \hline 1 \text{ qt.} \end{array}$$

3. Mr. Gray had a board that was $9\frac{2}{3}$ feet long. He used $6\frac{1}{3}$ feet to repair a door. How many feet of the board were left?

$$\begin{array}{r} 9\frac{2}{3} \text{ ft.} \\ -6\frac{1}{3} \text{ ft.} \\ \hline 3\frac{1}{3} \text{ ft.} \end{array}$$

Subtract these mixed numbers.

4.	$4\frac{1}{5}$	$7\frac{8}{9}$	$9\frac{11}{12}$	$8\frac{6}{7}$	$6\frac{2}{7}$	$5\frac{8}{9}$	$8\frac{6}{7}$	$9\frac{2}{5}$	$7\frac{3}{7}$
	$3\frac{1}{5}$	$2\frac{8}{9}$	$7\frac{11}{12}$	$4\frac{4}{7}$	$1\frac{1}{7}$	$2\frac{1}{9}$	$1\frac{1}{7}$	$3\frac{1}{5}$	$2\frac{1}{7}$

In rows 5 and 6 reduce the fraction in each answer to its lowest terms.

5.	$8\frac{5}{6}$	$9\frac{7}{8}$	$4\frac{5}{8}$	$9\frac{4}{9}$	$12\frac{9}{10}$	$14\frac{11}{12}$	$17\frac{9}{16}$	$6\frac{7}{8}$	$5\frac{3}{4}$
	$2\frac{1}{6}$	$4\frac{1}{8}$	$1\frac{3}{8}$	$3\frac{1}{9}$	$8\frac{1}{10}$	$6\frac{5}{12}$	$9\frac{3}{16}$	$1\frac{3}{8}$	$2\frac{1}{4}$
6.	$7\frac{5}{8}$	$6\frac{5}{9}$	$9\frac{8}{15}$	$8\frac{7}{12}$	$12\frac{7}{10}$	$16\frac{9}{16}$	$12\frac{4}{15}$	$9\frac{7}{9}$	$8\frac{7}{8}$
	$3\frac{1}{8}$	$6\frac{2}{9}$	$2\frac{2}{15}$	$4\frac{5}{12}$	$7\frac{1}{10}$	$8\frac{1}{16}$	$8\frac{1}{15}$	$3\frac{1}{9}$	$5\frac{5}{8}$

Find the answers for the subtraction examples below. Be sure that your answers are all in lowest terms.

7.	$\frac{4}{9}$	$\frac{8}{9}$	$\frac{3}{8}$	$\frac{7}{16}$	$4\frac{4}{7}$	$2\frac{2}{3}$	$7\frac{11}{15}$	$5\frac{11}{12}$	$6\frac{11}{16}$
	$\frac{2}{9}$	$\frac{4}{9}$	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{3}{7}$	$\frac{2}{3}$	$\frac{8}{15}$	$\frac{7}{12}$	$\frac{9}{16}$
8.	$\frac{8}{9}$	$\frac{7}{10}$	$\frac{7}{15}$	$2\frac{11}{15}$	$6\frac{14}{15}$	$5\frac{5}{6}$	$7\frac{11}{16}$	$2\frac{13}{15}$	$4\frac{8}{9}$
	$\frac{2}{9}$	$\frac{3}{10}$	$\frac{4}{15}$	$1\frac{2}{15}$	$5\frac{4}{15}$	$3\frac{1}{6}$	$3\frac{1}{16}$	$1\frac{4}{15}$	$4\frac{5}{9}$
9.	$\frac{4}{15}$	$\frac{7}{8}$	$3\frac{7}{12}$	$2\frac{9}{16}$	$47\frac{6}{15}$	$10\frac{3}{10}$	$3\frac{3}{7}$	$7\frac{9}{14}$	$32\frac{2}{3}$
	$\frac{1}{15}$	$\frac{5}{8}$	$\frac{1}{12}$	$\frac{5}{16}$	$2\frac{4}{15}$	$\frac{1}{10}$	$\frac{3}{7}$	$\frac{5}{14}$	$31\frac{1}{3}$

Subtracting a Fraction from One

1. Charles and his father built a house for their dog. Charles' father had 1 pound of nails. They used $\frac{2}{3}$ of a pound for the house. What fraction of a pound of nails was left?

You know that any whole quantity $= \frac{3}{3}$ of itself. Think of 1 pound as $\frac{3}{3}$ of a pound. $\frac{3}{3}$ and $\frac{2}{3}$ are like fractions. To subtract like fractions, you subtract the numerators. The numerators represent the number of parts you have in the minuend and in the subtrahend.

$$\begin{array}{rcl} 1 & = & \frac{3}{3} \\ -\frac{2}{3} & = & \frac{2}{3} \\ & & \frac{1}{3} \end{array}$$

What is the answer to the question in the problem?

Find the answers for these subtraction examples. Reduce the fractions in the answers to lowest terms when you need to.

2.

1	1	1	1	1	1	1	1	1
$-\frac{3}{4}$	$-\frac{1}{6}$	$-\frac{2}{9}$	$-\frac{3}{5}$	$-\frac{4}{7}$	$-\frac{5}{8}$	$-\frac{3}{10}$	$-\frac{7}{12}$	$-\frac{5}{6}$

3.

$7\frac{5}{8}$	$3\frac{2}{3}$	$4\frac{5}{8}$	$8\frac{7}{10}$	$3\frac{7}{8}$	$9\frac{3}{4}$	$7\frac{3}{5}$	$4\frac{8}{9}$	$8\frac{7}{10}$
$-3\frac{5}{8}$	$-\frac{1}{3}$	$-2\frac{1}{8}$	$-1\frac{1}{10}$	$-1\frac{1}{8}$	$-2\frac{1}{4}$	$-2\frac{1}{5}$	$-1\frac{2}{9}$	$-5\frac{3}{10}$

4.

$8\frac{5}{16}$	$3\frac{4}{5}$	$8\frac{7}{8}$	$7\frac{5}{12}$	$8\frac{4}{5}$	$8\frac{9}{10}$	$9\frac{4}{5}$	$6\frac{5}{7}$	$5\frac{5}{9}$
$-4\frac{3}{16}$	$-1\frac{1}{5}$	-3	$-2\frac{1}{12}$	$-\frac{3}{5}$	$-1\frac{7}{10}$	$-7\frac{2}{5}$	$-3\frac{1}{7}$	$-2\frac{2}{9}$

5.

$7\frac{3}{10}$	$4\frac{11}{12}$	$8\frac{7}{8}$	$14\frac{2}{5}$	$9\frac{3}{16}$	$8\frac{7}{8}$	$5\frac{11}{12}$	$7\frac{8}{9}$	$4\frac{9}{10}$
$-2\frac{1}{10}$	$-1\frac{7}{12}$	$-4\frac{3}{8}$	$-\frac{1}{5}$	$-1\frac{1}{16}$	$-4\frac{5}{8}$	$-4\frac{5}{12}$	$-2\frac{5}{9}$	$-1\frac{3}{10}$

6.

$9\frac{7}{12}$	$8\frac{2}{3}$	$7\frac{5}{8}$	$9\frac{7}{12}$	$8\frac{5}{7}$	$4\frac{5}{6}$	$2\frac{6}{7}$	$6\frac{11}{12}$	$7\frac{4}{15}$
$-5\frac{1}{12}$	-2	$-5\frac{3}{8}$	$-7\frac{5}{12}$	$-\frac{3}{7}$	$-4\frac{1}{6}$	$-1\frac{5}{7}$	$-3\frac{1}{12}$	$-2\frac{1}{15}$

Solve these problems:

7. Judy's mother used $\frac{2}{3}$ of a pie for dinner. What fraction of the pie was left?

8. Some boys walked $3\frac{9}{10}$ miles the first hour and $2\frac{7}{10}$ miles the second hour. How many more miles did they walk the first hour than the second?

9. Jane had a remnant of cloth $\frac{5}{6}$ of a yard long. What fraction tells how much less than a yard of cloth she had?

Changing Ones to Fractions in Subtraction

1. The first time that Jack tried to work the puzzle he put it together in $1\frac{1}{5}$ minutes. The second time it only took him $\frac{3}{5}$ of a minute. What fraction of a minute longer did it take Jack to work the puzzle the first time than the second time?

Subtract to find the answer. Do it like this:

$$\begin{array}{r} 1\frac{1}{5} = \frac{6}{5} \\ -\frac{3}{5} = \frac{3}{5} \\ \hline \frac{3}{5} \end{array}$$

You can see that $\frac{1}{5}$ is less than $\frac{3}{5}$ so change the 1 in the minuend to $\frac{5}{5}$. $\frac{5}{5} + \frac{1}{5} = \frac{6}{5}$. $\frac{6}{5} - \frac{3}{5} = ?$

What is the answer to the question the problem asks?

Copy and subtract. In examples in row 3, reduce the answers to lowest terms.

2. $1\frac{1}{3}$	$1\frac{2}{9}$	$1\frac{1}{5}$	$1\frac{3}{7}$	$1\frac{1}{9}$	$1\frac{1}{7}$	$1\frac{2}{5}$	$1\frac{5}{9}$	$1\frac{2}{5}$
$\frac{2}{3}$	$\frac{7}{9}$	$\frac{2}{5}$	$\frac{5}{7}$	$\frac{5}{9}$	$\frac{5}{7}$	$\frac{3}{5}$	$\frac{7}{9}$	$\frac{4}{5}$
3. $1\frac{1}{4}$	$1\frac{1}{8}$	$1\frac{1}{8}$	$1\frac{1}{6}$	$1\frac{2}{9}$	$1\frac{5}{8}$	$1\frac{1}{12}$	$1\frac{1}{10}$	$1\frac{1}{7}$
$\frac{3}{4}$	$\frac{5}{8}$	$\frac{7}{8}$	$\frac{5}{6}$	$\frac{5}{9}$	$\frac{7}{8}$	$\frac{7}{12}$	$\frac{9}{10}$	$\frac{3}{7}$

4. Nora's mother needed $7\frac{1}{3}$ cups of flour for bread. She decided to use $\frac{2}{3}$ of a cup of whole wheat flour and the rest white flour. How many cups of white flour did she need?

Subtract to find the answer, like this:

$$\begin{array}{r} 7\frac{1}{3} = 6\frac{4}{3} \\ -\frac{2}{3} = \frac{2}{3} \\ \hline 6\frac{2}{3} \end{array}$$

Because $\frac{1}{3}$ is less than $\frac{2}{3}$, you change 1 one to $\frac{3}{3}$. Remember that 6 ones are left. $\frac{3}{3} + \frac{1}{3} = \frac{4}{3}$. $\frac{4}{3} - \frac{2}{3} = ?$ Bring down 6 ones.

What is the answer for the problem?

Copy the examples below and subtract. Reduce the answer to lowest terms when you need to.

5. $2\frac{1}{9}$	$5\frac{2}{7}$	$9\frac{1}{5}$	$8\frac{2}{9}$	$10\frac{3}{5}$	$15\frac{1}{7}$	$6\frac{1}{4}$	$7\frac{1}{6}$	$8\frac{4}{9}$
$\frac{5}{9}$	$\frac{3}{7}$	$\frac{4}{5}$	$\frac{4}{9}$	$\frac{4}{5}$	$\frac{4}{7}$	$\frac{3}{4}$	$\frac{5}{6}$	$\frac{7}{9}$

Mixed Numbers to Subtract

In the examples below, the fraction in the subtrahend is larger than the fraction in the minuend, so you change 1 one to a fraction and add it to the fraction already there.

Study the examples at the right. Be sure that you understand how each is worked.

A	B
$2\frac{1}{5} = 1\frac{6}{5}$	$4\frac{1}{4} = 3\frac{5}{4}$
$-1\frac{4}{5} = 1\frac{4}{5}$	$-3\frac{3}{4} = 3\frac{3}{4}$
$\frac{2}{5}$	$\frac{2}{4} = \frac{1}{2}$

1. In A why was 1 changed to $\frac{5}{5}$? Why does $2\frac{1}{5} = 1\frac{6}{5}$?

2. What is the answer for example A?

3. Explain why 1 one was changed to $\frac{4}{4}$ in example B. Why does $4\frac{1}{4} = 3\frac{5}{4}$?

4. How do you reduce $\frac{2}{4}$ to its lowest terms?

5. What is the answer for example B?

6. Why are there no ones in the answers for A and B?

Copy and subtract. Be sure answers are in lowest terms.

7.

$5\frac{1}{9}$	$6\frac{3}{7}$	$6\frac{1}{8}$	$3\frac{2}{9}$	$9\frac{5}{7}$	$9\frac{1}{5}$	$2\frac{1}{7}$	$8\frac{1}{9}$	$7\frac{1}{8}$
$-4\frac{8}{9}$	$-5\frac{4}{7}$	$-5\frac{7}{8}$	$-2\frac{7}{9}$	$-8\frac{6}{7}$	$-8\frac{3}{5}$	$-1\frac{5}{7}$	$-7\frac{7}{9}$	$-3\frac{3}{8}$

8.

$7\frac{3}{8}$	$4\frac{2}{9}$	$6\frac{5}{8}$	$9\frac{1}{6}$	$6\frac{1}{8}$	$9\frac{4}{9}$	$3\frac{3}{10}$	$8\frac{1}{9}$	$9\frac{3}{8}$
$-6\frac{5}{8}$	$-3\frac{5}{9}$	$-5\frac{7}{8}$	$-8\frac{5}{6}$	$-5\frac{5}{8}$	$-8\frac{7}{9}$	$-2\frac{7}{10}$	$-7\frac{4}{9}$	$-4\frac{7}{8}$

Solve these problems:

9. Jane's mother had a recipe that called for $2\frac{1}{4}$ pounds of ground meat. She wants to use $1\frac{3}{4}$ pounds of beef and the rest pork. What fraction of a pound of pork does she need?

10. A tailor used $4\frac{1}{6}$ yards of cloth for a suit for John and $3\frac{5}{6}$ yards for a suit for his brother. What fraction of a yard more cloth did he use for the larger suit than for the smaller suit?

11. Joan is $54\frac{3}{8}$ inches tall and Doris is $53\frac{7}{8}$ inches tall. What fraction of an inch shorter is Doris than Joan?

More about Subtracting Mixed Numbers

In some of the examples on this page you will find that there are both ones and fractions in the answers.

1. A salesgirl knew that there were still $9\frac{1}{3}$ yards of cloth on a bolt of material. She sold $2\frac{2}{3}$ yards. How many yards of cloth were left on the bolt?

Study the example for the problem. Notice that both the minuend and the subtrahend are mixed numbers and that there are ones in the answer. How many yards of cloth were left?

$$\begin{array}{rcl} 9\frac{1}{3} & = & 8\frac{4}{3} \\ -2\frac{2}{3} & = & 2\frac{2}{3} \\ & & 6\frac{2}{3} \end{array}$$

Find the answers for these subtraction examples:

2.

$4\frac{2}{7}$	$6\frac{1}{5}$	$8\frac{1}{9}$	$9\frac{2}{9}$	$8\frac{3}{5}$	$7\frac{1}{7}$	$5\frac{2}{5}$	$3\frac{3}{7}$	$5\frac{1}{5}$
$1\frac{3}{7}$	$3\frac{3}{5}$	$2\frac{5}{9}$	$6\frac{4}{9}$	$3\frac{4}{5}$	$4\frac{4}{7}$	$1\frac{3}{5}$	$1\frac{4}{7}$	$2\frac{3}{5}$

The examples in row 3 are like those in row 2 except that the fraction in each answer should be reduced to lowest terms. Study the example at the right. What is the answer?

$$\begin{array}{rcl} 5\frac{1}{6} & = & 4\frac{7}{6} \\ -3\frac{5}{6} & = & 3\frac{5}{6} \\ & & 1\frac{2}{6} = 1\frac{1}{3} \end{array}$$

3.

$9\frac{3}{8}$	$17\frac{4}{9}$	$6\frac{3}{10}$	$15\frac{3}{8}$	$8\frac{1}{9}$	$27\frac{1}{10}$	$5\frac{1}{12}$	$4\frac{1}{8}$	$6\frac{5}{12}$
$2\frac{5}{8}$	$8\frac{7}{9}$	$3\frac{7}{10}$	$11\frac{7}{8}$	$1\frac{7}{9}$	$12\frac{3}{10}$	$2\frac{5}{12}$	$1\frac{7}{8}$	$1\frac{7}{12}$

Subtract. Be sure the answers are in lowest terms:

4.

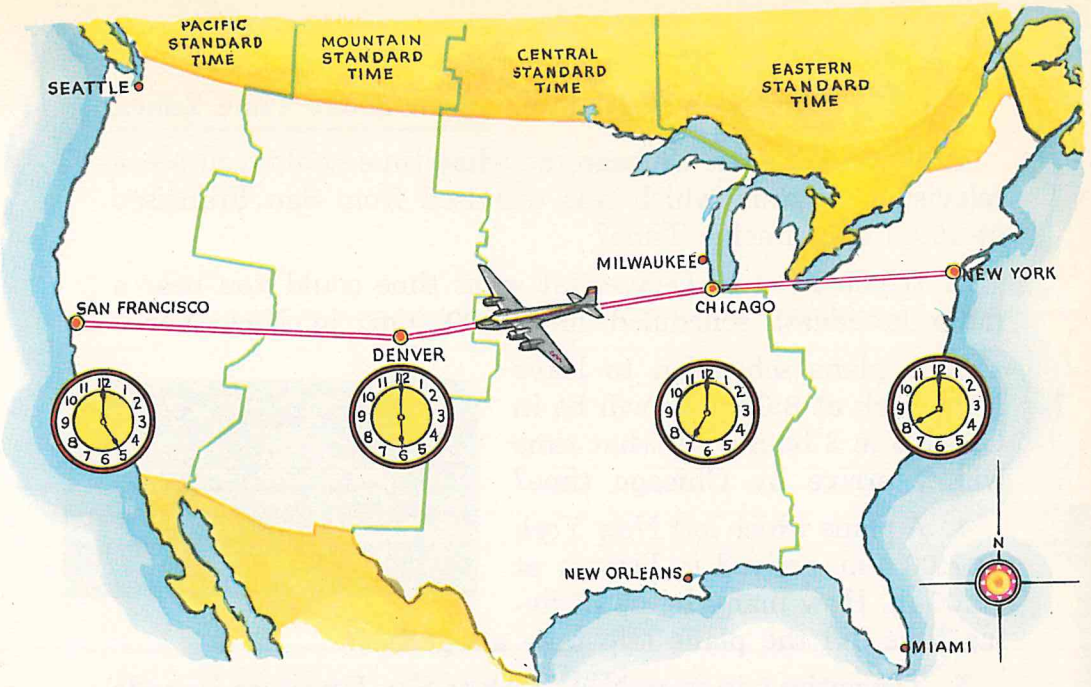
$\frac{2}{3}$	$\frac{7}{9}$	$\frac{6}{7}$	$\frac{4}{5}$	$\frac{3}{4}$	$\frac{5}{16}$	$\frac{9}{11}$	$\frac{11}{15}$	$\frac{9}{16}$	$\frac{9}{10}$
$\frac{1}{3}$	$\frac{4}{9}$	$\frac{3}{7}$	$\frac{3}{5}$	$\frac{1}{4}$	$\frac{1}{16}$	$\frac{2}{11}$	$\frac{7}{15}$	$\frac{8}{16}$	$\frac{1}{10}$

5.

$\frac{5}{8}$	$\frac{3}{10}$	$\frac{7}{16}$	$\frac{11}{16}$	$\frac{7}{12}$	$6\frac{2}{5}$	$5\frac{4}{5}$	$3\frac{5}{6}$	$4\frac{11}{12}$
$\frac{1}{8}$	$\frac{1}{10}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{12}$	$\frac{1}{5}$	$\frac{2}{5}$	$\frac{1}{6}$	$\frac{1}{12}$

6.

$3\frac{3}{4}$	$7\frac{1}{5}$	$4\frac{1}{4}$	$5\frac{5}{7}$	$5\frac{9}{10}$	$9\frac{5}{9}$	$6\frac{5}{8}$	$7\frac{4}{5}$	$3\frac{15}{16}$
$\frac{3}{4}$	7	$1\frac{1}{4}$	$3\frac{1}{7}$	$3\frac{3}{10}$	$7\frac{5}{9}$	$3\frac{3}{8}$	$2\frac{1}{5}$	$1\frac{7}{16}$



Understanding Time Zones

The United States is divided into *time zones*. If an airliner leaves New York at 8:00 a.m., it is 7:00 a.m. Central Time, 6:00 a.m. Mountain Time, and 5:00 a.m. Pacific Time.

Travelers usually change their watches to agree with the time zone that they are in. On a westward trip they set their watches back 1 hour each time that they enter a new time zone. On an eastward trip they set their watches ahead 1 hour each time that they enter a new time zone.

1. How many time zones are there in the United States?

2. Look at the clock faces and find the difference in time between two zones that touch.

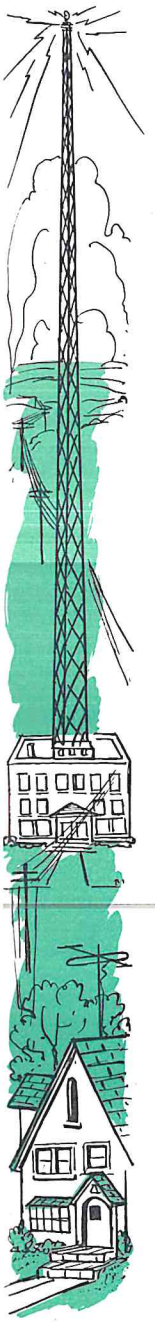
3. In what time zone do you live?

4. How many times would a person change his watch in traveling from New York to San Francisco?

5. Would you have to change your watch in traveling from New York to Miami? Why?

6. At 5:00 p.m. in New York, what time is it in Denver?

More about Time Zones



1. If you lived in Chicago, at what time could you see a television program which was televised from San Francisco at 10:00 a.m. Pacific Time?

2. If you lived in Denver, at what time could you hear a radio broadcast scheduled for 11:00 a.m. in New York?

3. A plane scheduled to leave New York at 8:00 a.m. will be in Chicago in 3 hours. At what time will it arrive by Chicago time?

8	a.m. Eastern Time
+3	hrs. travel time
11	a.m. Eastern Time
−1	hr. change in time
10	a.m. Central Time

4. A plane which left New York at 7:00 a.m. arrived in Denver at 12:00 m. How many hours of flying time did the plane trip take altogether?

5. The entire trip from New York to San Francisco is made by some airplanes in 11 hours 30 minutes. At what time (Pacific Time) would such a plane arrive in San Francisco if it left New York at 10:00 a.m.?

6. A plane left Denver at 8:30 a.m. Mountain Time and arrived in Chicago at 1:00 p.m. Central Time. How many hours did it take to make the flight?

7. A plane left San Francisco at 12:30 p.m. Pacific Time and arrived in Denver at 5:30 p.m. Mountain Time. How many hours did it take to make the flight?

8. Mr. Harper lives in Milwaukee. When he made a trip to New York, he called his family by long distance telephone. If he made the call at 7:30 p.m. in New York, what time was it in Milwaukee?

9. If a fast jet plane left New York at 5:00 a.m. (Eastern Time) and landed in San Francisco at 7:00 a.m. (Pacific Time), how long did it take to make the flight?

10. A football game played in Salt Lake City was televised, beginning at 1:30 p.m. Mountain Time. What time would that be in Cleveland?

Five-Place Numbers in Addition and Subtraction

1. Study each example below. Review the steps you must take to find its answer. Be sure you understand each step.

62314	38561	67485	83769
A +4253	B +25217	C −3274	D −47136
66567	63778	64211	36633

- In example A, first add ones, then tens, then hundreds, then thousands, and bring down the *ten-thousands*.
- In B add ones, tens, hundreds, and thousands. Change 10 *thousands* to 1 *ten-thousand*. Then add *ten-thousands*.
- In example C first subtract ones, then tens, then hundreds, then thousands, and then bring down the *ten-thousands*.
- In example D you must change 1 *ten-thousand* to 10 *thousands* before subtracting thousands or ten-thousands.

Add. Remember to change 10 thousands to 1 ten-thousand whenever necessary:

2.	42134	65790	13691	30765	65076	48653
	6318	4285	2807	2187	8321	3789
3.	37619	54263	82623	67103	21096	45768
	41325	15352	25641	18205	42375	27947

Subtract. Remember to change 1 ten-thousand to 10 thousands whenever necessary:

4.	57648	68431	27695	51679	64130	37001
	2315	2123	1862	2435	7357	2352
5.	46785	67890	76827	96035	83569	50032
	13241	35267	41568	13246	27234	23146

You will remember:

- You add and subtract *ten-thousands* in the same way that you add and subtract *thousands*, *hundreds*, *tens*, or *ones*.

A Scale Drawing

The above map is drawn to scale. Each 1 inch on the map represents 6 blocks in the real city. The map is 5 inches wide. Five inches on the map represents 30 blocks.

Use your ruler to help you answer these questions about the map at the top of the page. The red squares stand for children's homes in the area.

1. One inch on the map equals how many blocks?

2. How many inches long is the part of Main Street shown on the drawing?

3. How many blocks long is Main Street?

4. How many blocks long is Division Street?

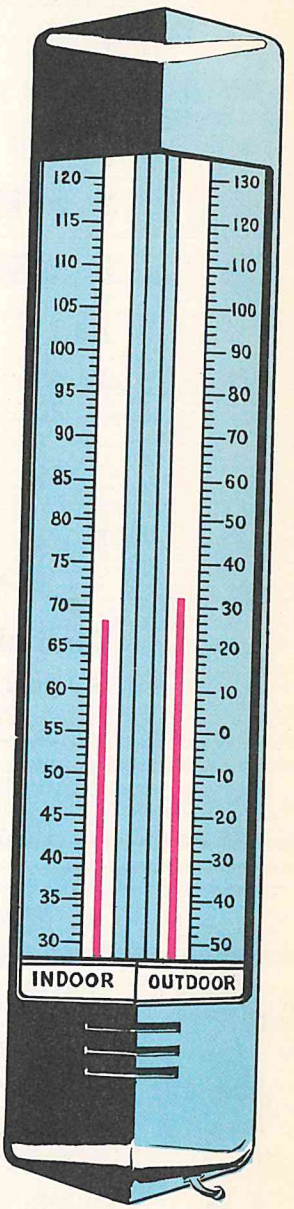
5. How many blocks is it from James' home to Mary's home?

6. How many blocks would Jack have to walk to go from his home to Dick's home?

Measuring Temperature

You know that temperature is measured in degrees. A small circle written after a number, like this (68°), means degrees. When the temperature falls below 0, a minus sign is written before the number, like this: −10°.

The thermometer pictured on this page shows two temperatures. One is the outside temperature which the thermometer shows as 32°. This is the freezing point of water. The other shows the inside temperature. How warm is it inside?



Solve these problems:

1. Look at the thermometer in the picture. How much warmer is it inside than outside?

2. If the temperature rises from −10° to 20° how many degrees does it rise?

3. During the day the outside temperature rose from freezing to 61°. How much did it rise?

4. On a winter day it was 77° in Miami and 9° in Chicago. How much warmer was it in Miami than in Chicago?

5. Below are the highest and lowest temperatures ever recorded in each city listed. For each city find the difference between the highest temperature and the lowest.

City	High	Low
San Francisco, California	101	27
Houston, Texas	108	5
Miami, Florida	96	27
Seattle, Washington	100	3
Madison, Wisconsin	107	−29
Bismark, North Dakota	114	−45

6. How many degrees colder was Bismark's low temperature than Miami's high temperature?

Find the answers for the examples and problems on this page.

Subtract:

1.

372	700	8594	$\frac{7}{9}$	$4\frac{4}{9}$	$8\frac{1}{4}$	$4\frac{3}{8}$	$4\frac{1}{6}$
145	122	6748	$\frac{5}{9}$	$\frac{1}{9}$	$2\frac{1}{4}$	$1\frac{7}{8}$	$2\frac{5}{6}$

Divide:

2. $20\overline{)80}$ $16\overline{)85}$ $40\overline{)84}$ $15\overline{)78}$ $35\overline{)74}$ $18\overline{)72}$ $13\overline{)117}$

3. $19\overline{)95}$ $14\overline{)29}$ $21\overline{)86}$ $12\overline{)99}$ $30\overline{)62}$ $17\overline{)89}$ $31\overline{)250}$

Add:

4.

65	276	743	360	236	4612	1275	23950
20	3	412	153	497	7103	3140	7009
6	47	700	282	581	3021	1093	6842
19	2845	521	171	684	6213	2381	14187

5.

$7\frac{1}{8}$	3	$5\frac{1}{6}$	$2\frac{1}{3}$	$4\frac{1}{9}$	$2\frac{3}{7}$	$6\frac{3}{4}$	$9\frac{7}{16}$	$4\frac{1}{8}$
$\frac{3}{8}$	$4\frac{1}{5}$	2	$4\frac{1}{3}$	$6\frac{5}{9}$	$1\frac{5}{7}$	$5\frac{3}{4}$	$3\frac{13}{16}$	$2\frac{7}{8}$

Multiply:

6.

3250	6897	45	92	46	50	90	36	25
5	8	25	35	89	77	60	84	23

Find the answers:

7. Prove which is the longest distance: $\frac{1}{6}$ or $\frac{1}{4}$ of 480 miles.

8. Find the average of these amounts: \$1.42, \$3.26, \$5.80, \$6.22, and \$4.65.

9. Joyce wanted a pair of roller skates that cost \$4.98. She saved 75¢ a week for 5 weeks. How much more money did she need to buy the skates?

10. From a 10-pound carton a storekeeper sold $1\frac{3}{4}$ pounds of candy to one customer and $\frac{3}{4}$ of a pound to another. How many pounds of candy should be left in the carton?

To Help You Remember

The page numbers after the questions and examples tell you where to turn for help if you need it.

▶ *To think and talk about:*

1. If you buy lunch for 36¢ and pay with a dollar bill, how does the cashier make change? How can you be sure that your change is correct? (23)

2. How do you subtract $\frac{2}{3} - \frac{1}{3}$? (145)

3. Explain how you would subtract $1 - \frac{1}{3}$. (149)

4. What do you do when a fraction in an answer is not in its lowest terms? (107, 146)

5. When you subtract mixed numbers, sometimes the fraction in the subtrahend is larger than the one in the minuend. Then what do you do? (150)

6. When it is 12 noon in New York, what time is it in San Francisco? (153)

7. Discuss the uses of units of measure for weight (124), time (125), length (123), liquids (140), and dry articles (140).

▶ *To think about and write:*

1. What is the difference in time between Eastern Time and Mountain Time? (153)

2. Find the difference between $3\frac{1}{3}$ and $1\frac{2}{3}$. (151)

3. Find the sum of $2\frac{5}{8} + 4\frac{7}{8}$. (139)

4. Find $\frac{1}{4}$ of 16 oz., $\frac{2}{3}$ of 27¢, $\frac{5}{8}$ of \$40. (45)

5. Which of each pair of fractions is larger? (103, 104)

$\frac{1}{7}$ or $\frac{1}{6}$ $\quad\quad$ $\frac{5}{8}$ or $\frac{7}{8}$ $\quad\quad$ $\frac{1}{3}$ or $\frac{1}{4}$ $\quad\quad$ $\frac{5}{9}$ or $\frac{8}{9}$

6. Reduce each fraction to its lowest terms. (107)

$\frac{2}{4}$ $\quad$ $\frac{3}{6}$ $\quad$ $\frac{4}{8}$ $\quad$ $\frac{2}{6}$ $\quad$ $\frac{4}{6}$ $\quad$ $\frac{6}{8}$ $\quad$ $\frac{3}{9}$ $\quad$ $\frac{5}{10}$ $\quad$ $\frac{6}{10}$

7. Find the sum of 45739, 8003, and 275. (155)

8. Find the difference between 57003 and 21226. (155)

Testing Yourself

Find the answers for the examples and problems on this page.

Add:

1.

375							25008
389							7364
641	$4\frac{1}{7}$	$3\frac{2}{9}$	$6\frac{4}{7}$	$2\frac{5}{8}$	$5\frac{7}{16}$	$1\frac{3}{5}$	13918
708	$2\frac{1}{7}$	$2\frac{1}{9}$	$4\frac{4}{7}$	$1\frac{5}{8}$	$4\frac{11}{16}$	$4\frac{2}{5}$	2657

Multiply:

2.

2468	8550	30	64	35	48	88	94	37
3	7	50	20	74	27	65	89	62

Subtract:

3.

$\frac{4}{7}$	$3\frac{7}{8}$	$6\frac{1}{2}$	$4\frac{1}{4}$	$9\frac{1}{10}$	417	601	6894
$\frac{1}{7}$	$\frac{5}{8}$	$2\frac{1}{2}$	$2\frac{3}{4}$	$4\frac{7}{10}$	245	327	3987

Divide:

4. $30\overline{)60}$ $14\overline{)70}$ $24\overline{)73}$ $16\overline{)96}$ $12\overline{)63}$ $22\overline{)90}$ $35\overline{)140}$

Find the answers:

5. What is the sum of \$89.72, \$45.60, and \$92.57?

6. Find the product of 45×24.

7. Find the quotient and the remainder for $467 \div 2$.

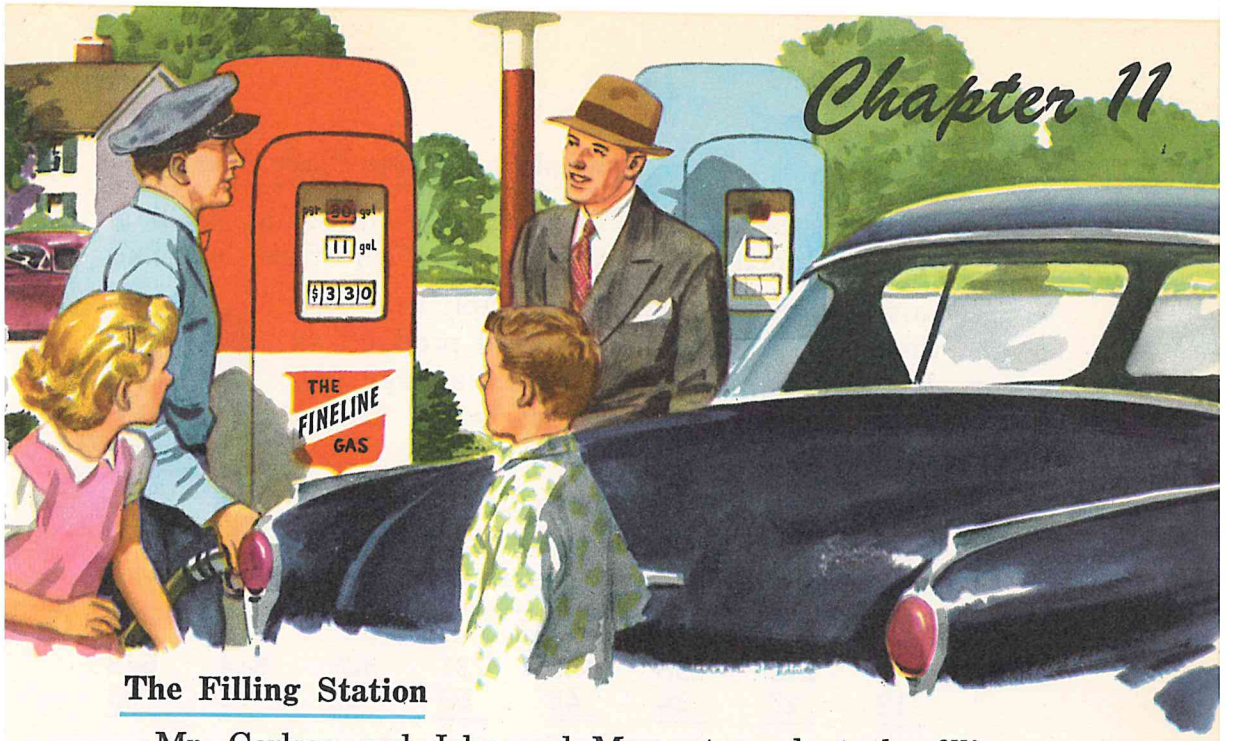
8. What is the difference between \$95.00 and \$74.65?

9. Jerry's father makes a 95-mile business trip each week. How many miles does he travel on these business trips in 48 weeks?

10. Janet's weight dropped from $87\frac{3}{4}$ pounds to $79\frac{1}{4}$ pounds. How much weight did she lose?

11. Jane bought 2 books that cost \$1.98 each. How much change should she get from \$5?

12. In 7 days John delivered 434 papers. What was the average number of papers delivered per day?



The Filling Station

Mr. Carlson and John and Mary stopped at the filling station to buy gas and oil. Problem 1 is about the gas and oil they bought. Answer the question which that problem asks. Then find the answers for the other problems below.

1. Look at the pump and find the cost of the gas that Mr. Carlson bought. He also bought 2 quarts of oil at 36¢ a quart. How much will he have to pay?

2. A young man bought $\frac{1}{2}$ gallon of gas for his motor bicycle. How much did it cost?

3. A truck driver bought 65 gallons of gas. How much would he have to pay?

4. A farmer bought $\frac{1}{2}$ gallon of heavy oil and $\frac{1}{2}$ gallon of light oil at 36¢ a quart. How much change should he get from $5.00?

5. Bob's father bought car cleaner for 98¢, wax for $1.25, and a polishing cloth for 49¢. How much change should he get from $5?

6. Oil was on sale in 2-gallon cans that cost $2 each. At this rate, what was the price per quart?

Multiplying Three-Place Numbers

1. Homer's father sold 15 bushels of apples at $2.25 a bushel. How much money did he get for all fifteen bushels?

To answer the question, you multiply by 5 ones and then by 1 ten. Add the partial products to get the total product. Use the dollar sign and the cents point correctly. What is the answer to the question in the problem?

$$\begin{array}{r} \$2.25 \\ \times 15 \\ \hline 11\ 25 \\ 22\ 5 \\ \hline \$33.75 \end{array}$$

Find the answers for the multiplication examples below. Check each answer by multiplying again. Change ones to tens, tens to hundreds, and hundreds to thousands when it is necessary to do so.

2.	342	218	156	431	731	528	814	648
	12	23	34	45	69	32	76	53
3.	420	180	690	103	304	705	200	400
	21	35	58	75	28	89	43	32
4.	514	763	609	986	985	594	572	896
	51	60	76	83	59	46	73	75

In this example there are no ones in the multiplier. That is why there are no ones in the product. The short way to find the answer is to write 0 in ones' place and then multiply by tens.

$$\begin{array}{r} 275 \\ \times 20 \\ \hline 5500 \end{array}$$

Find the products for these examples:

5.	123	249	314	432	230	380	610	890
	30	20	60	40	30	20	40	70
6.	207	304	902	408	300	700	600	900
	40	20	30	50	40	90	50	80
7.	465	509	420	987	654	876	500	922
	78	60	50	87	35	40	30	65

8.	$2.35	$4.80	$9.80	$5.00	$6.27	$3.49	$4.90
	45	20	37	50	74	76	80

Problems to Solve

Read each problem carefully. Be sure you understand what it means and what question it asks. Then read the problem again to see what facts are given which help you answer the question. Write A for add, S for subtract, M for multiply, or D for divide. Then find the answer.

1. A farmer loaded 25 bags of wheat on his truck. Each bag weighed 120 pounds. What was their total weight?

2. Mrs. Jackson paid \$12.85 for a pair of shoes and \$49.98 for a coat. How much did she pay for both?

3. Mr. Johnson earned \$95.50 one week and \$89.75 the next week. How much more did he earn the first week than the second week?

4. Jack plans to add \$1.25 a month to his savings account. How much will he save in a year?

5. A farmer sold 15 bushels of peaches at \$3.25 a bushel. How much money did he get for the peaches?

6. The teacher collected \$1.79 for bus fare from each of 27 children. How much money did she collect?

7. Mr. Williams bought 8 acres of land for \$2480. What was the cost per acre?

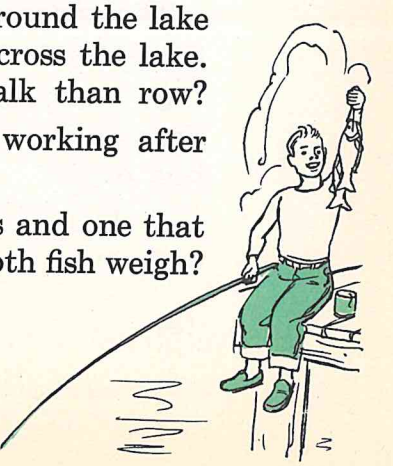
8. On a hike the Boy Scouts walked $2\frac{3}{4}$ miles the first hour and $3\frac{1}{4}$ miles the second hour. How many miles did they walk altogether?

9. Six boys rented a boat for 3 days at \$1.50 a day. What was each boy's share of the rent?

10. Tom and his father walked $\frac{2}{3}$ of a mile around the lake to get a boat. They rowed $\frac{1}{3}$ of a mile back across the lake. What fraction of a mile farther did they walk than row?

11. Sue's older brother earns 80¢ an hour working after school. How much will he earn in 40 hours?

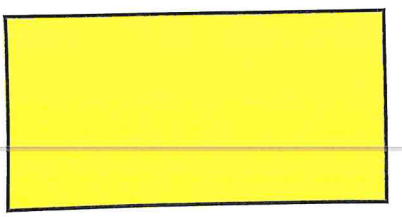
12. Jim caught a fish that weighed $1\frac{1}{4}$ pounds and one that weighed $\frac{3}{4}$ of a pound. How many pounds did both fish weigh?



Learning about Squares and Rectangles

The sign at the left in the picture is a *square*. It has 4 straight sides and 4 square corners called *right angles*. All of the sides of the square are equal.

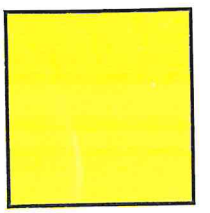
The sign in the center is a *rectangle*. It also has four right angles, but two of its four sides are longer than the other two.



1. Which drawing shown at the right is a square? Which is a rectangle?

2. How many right angles do you see in each drawing shown at the right?

The *dimensions* of a rectangle or a square are its *length* and its *width*.



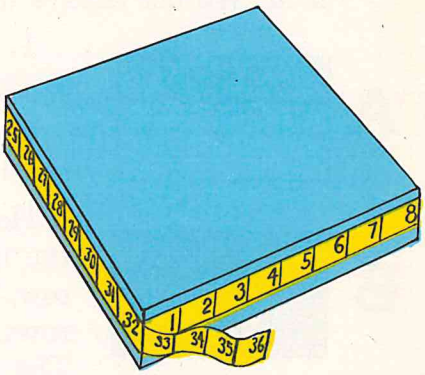
3. Use your ruler to measure the dimensions of the yellow square and rectangle on this page.

4. Draw a 3-inch square.

5. Draw a rectangle which is 4 inches by 6 inches.

Learning about Perimeters

Squares and rectangles have outer edges which have length. The distance around a square or rectangle, or its *perimeter*, is equal to the length of all the outside edges together.



1. How long is each side of the box in the picture? How many sides does the box have? What is its perimeter?

2. The short way to find the perimeter of a square is to multiply the length of one side by 4. Do you see why? 4 × 8 in. = 32 in., which is the perimeter of an 8-inch square.

3. Mr. Thompson needs a strip of metal long enough to go around the outer edge of a table 6 ft. long and 3 ft. wide. How many feet of metal does he need?

To find the perimeter you could add the lengths of the outer edges. 6 ft. + 3 ft. + 6 ft. + 3 ft. = 18 ft.

The shorter way is to add the length and width and multiply by 2. 6 ft. + 3 ft. = 9 ft. 2 × 9 ft. = 18 ft.

4. Find the perimeter of a board 10 in. wide and 14 in. long.

5. Find the perimeter of a 9-inch square of leather.

Find the perimeter of rectangles or squares with dimensions as follows:

6. 4 in. and 4 in. 6 in. and 5 in. 8 in. and 5 in.

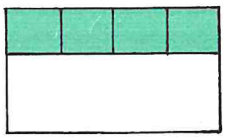
7. 8 in. and 3 in. 10 in. and 10 in. 4 ft. and 2 ft.

You will remember:

- The *perimeter* of a *square* equals 4 × *the length of one side.*
- The *perimeter* of a *rectangle* equals 2 × *the sum of the length and the width.*

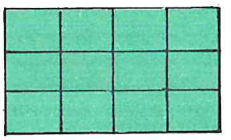
Learning about Areas

The space inside the perimeter of a rectangle or a square is called the *surface*. The size of any surface is called the *area*. We use square units of measure to find areas.

A 

1. How many square units are there along the top edge of rectangle A?

2. How many square units were needed to cover rectangle B?

B 

Here is a short way to find areas. Count the number of square units needed for one row. There are 4. Then count the number of rows. There are 3. Multiply 3 × 4 sq. units. The area is 12 square units.

The square units most often used are square inches, square feet, and square yards.

Table of Square Measure

144 sq. in. = 1 sq. ft.
9 sq. ft. = 1 sq. yd.

3. What square unit would you use to measure the area of your book? Of your classroom? Of a large gym?

4. How many square inches could you lay along the edge of a paper 12 inches long?

5. How many rows of square inches are needed to cover a paper 9 inches wide?

6. What is the area of a paper 12 in. long and 9 in. wide?

7. What is the area of a desk 20 in. wide and 42 in. long?

8. What is the area of a floor 9 ft. wide and 11 ft. long?

You will remember:

To find the area of a *square* or a *rectangle*, *multiply* its *length by* its *width*.

Building a Dog House

Jack built the dog house shown in the picture. He used a large packing box, which he covered with heavy roofing paper.

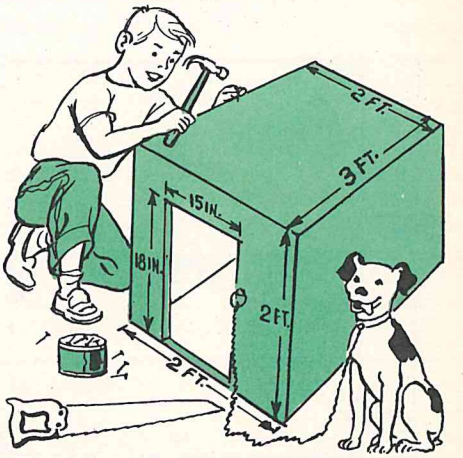
1. How many square feet of roofing paper did he need to cover the top of the dog house?

2. How many square feet of roofing paper did he need to cover both sides of the house?

3. How many square feet are needed to cover the back of the house?

4. What is the area of the doorway in square inches?

5. Find the area of the front in square inches. (Do you see that the dimensions of the front in inches are 24 in. × 24 in.?)



6. How many square inches of roofing paper will be used to cover the front side around the doorway?

7. How long a strip of board 2 inches wide is needed to put a frame around the top and sides of the door opening?

8. What is the perimeter of the bottom of the house?

9. Copy and complete the charts below:

Chart A

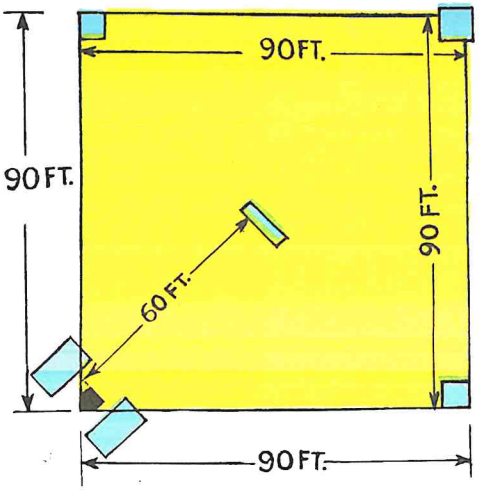
Length	Width	Area
4 ft.	3 ft.	12 sq. ft.
9 in.	5 in.	?
8 yd.	3 yd.	?
7 ft.	4 ft.	?
6 yd.	1 yd.	?
3 ft.	2 ft.	?
8 ft.	2 ft.	?
8 yd.	2 yd.	?

Chart B

Length	Width	Perimeter
6 ft.	2 ft.	16 ft.
5 in.	3 in.	?
7 in.	6 in.	?
2 ft.	7 ft.	?
2 yd.	5 yd.	?
9 ft.	6 ft.	?
3 yd.	6 yd.	?
5 yd.	8 yd.	?

A Baseball Team

Some of the high school boys organized a baseball team and made a baseball diamond like the one in the picture. Use the diagram of the baseball diamond which you see below to help you answer some of the questions on this page.



1. What is the area of the baseball diamond?

2. What is the distance a player would have to go to make a run?

3. How much farther is it from home plate to first base than from home plate to the pitcher's box?

4. The boys would like to get canvas bases that cost \$3.29 each. How much would they have to pay for the 3 bases that they need?

5. The boys want to order 9 new uniforms that cost \$6.50 each. How much money do they need for all of the uniforms?

6. The catcher for the team wanted a chest protector that cost \$3.75, leg guards that cost \$4.98, and a catcher's mask that cost \$6.94. What would be the total cost?

7. In their first 20 games the team made 182 runs. To the nearest number how many runs did the team make per game?

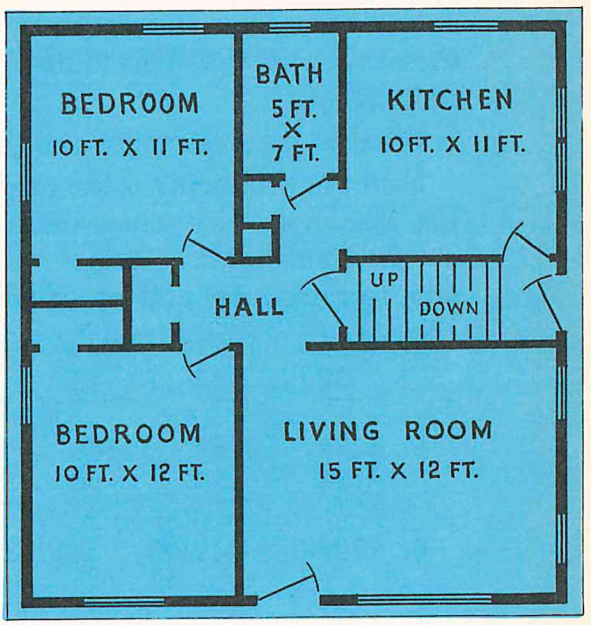
8. The 14 members of the squad traveled to Johnston in a bus. The total cost of the tickets was \$15.68. Meals cost \$17.92. What was each boy's share of the expenses?

9. The team had been getting baseballs for \$1.79 each. They learned that they could get baseballs for \$9.60 by the half-dozen. How much money can they save on each baseball if they get a half-dozen at a time?

10. If the team played 24 games during the season and won 17 games, how many more games did they win than lose?

A New House

1. Mr. Hill paid $975 for a lot on which he built a house with a floor plan like the one shown at the right below. The house cost $9850. Mr. Hill paid $775 extra for a garage, $498 for street paving, and $250 for sidewalks. What was the total cost?



2. Mrs. Hill wanted tile on the bathroom floor. At 49¢ a square foot, how much did the tile cost?

3. How many square feet are there in the floor of the kitchen?

4. What is the perimeter of the kitchen?

5. Mrs. Hill plans to buy a rug that is 12 feet by 10 feet for the living room. How much longer is the living room than the rug? How much wider is the living room than the rug?

6. Mrs. Hill can buy a rug and rug pad for $225. The pad alone costs $19.50. What is the cost of the rug?

7. How many feet longer is the larger bedroom than the smaller bedroom?

8. How many square feet are there in the floor of the larger bedroom?

9. The garage will be set on a base of concrete 14 feet by 22 feet. How many square feet will there be in that concrete base?

10. The carpenter could fit a cabinet door in 20 minutes. How many cabinet doors could he fit in 2 hours' time?

Multiplying Four-Place Numbers

1. Mr. Knapp hauls 1240 gallons of milk in his tank truck in each load. One month he delivered 21 loads to a cheese factory. How many gallons in all did he deliver that month?

You know that you multiply thousands in the same way that you multiply ones, tens, or hundreds.

What is the answer for the problem?

Find the products for the examples below. Use the short way when there are no ones in the multiplier. Change ones to tens, tens to hundreds, and so on when necessary to do so.

```
  1240 gal.
   ×21
  1240
 2480
 26040 gal.
```

2.	1321	1327	2040	1730	2609	1975	4203
	32	32	43	54	23	35	23
3.	1234	2750	1148	1609	1937	4500	3006
	20	30	60	40	50	70	90
4.	$30.00	$12.00	$40.02	$21.30	$32.08	$10.45	
	20	40	20	30	20	50	
5.	8600	9876	6875	5719	$43.24	$34.75	
	98	32	30	80	20	30	

Solve these problems:

6. A filling station owner bought 18 batteries at $24.75 each. What was the total cost?

7. What is the perimeter of a city lot that is 51 feet wide and 125 feet long?

8. Roy's grandfather has 16 acres planted in peas. He expects to get 2480 pounds of peas per acre. If his estimate is correct, how many pounds of peas will he get?

9. Harry's father operates a dairy farm. His best cow gives about 1700 pounds of milk a month. At this rate how much milk would the cow give in 10 months?

Using Three-Place Multipliers

1. Bob and his father measured the new garden. It was 122 feet wide and 211 feet long. What was its area?

Study the example. First you multiply by ones, then by tens, and then by hundreds.

Notice that you multiply by hundreds in the same way you multiply by ones or tens.

How many partial products are there? Notice that the third partial product is 21,100, even though we do not write 0 in tens' or ones' places.

The area of the garden is 25,742 square feet.

$$\begin{array}{r} 211 \\ \times 122 \\ \hline 422 \\ 422 \\ 211 \\ \hline 25742 \end{array}$$

Find the products for the examples below. Check your work.

2.

123	400	301	240	333	987	402	310
212	221	123	122	323	111	123	382

3.

412	650	434	500	309	700	564	724
321	173	462	357	635	879	543	413

If there are no tens in the multiplier, use the short way shown at the right. Multiply by ones, write 0 in tens' place in the second partial product and then multiply by hundreds. Multiply:

$$\begin{array}{r} 342 \\ \times 201 \\ \hline 342 \\ 6840 \\ \hline 68742 \end{array}$$

4.

234	320	106	300	765	607	970
102	301	407	204	302	809	708

When there are no ones or tens in the multiplier, use the short way as shown. Write 0 in ones' place and also in tens' place. Then multiply by the hundreds. Find and check the products for the examples below. Use the short way when you can.

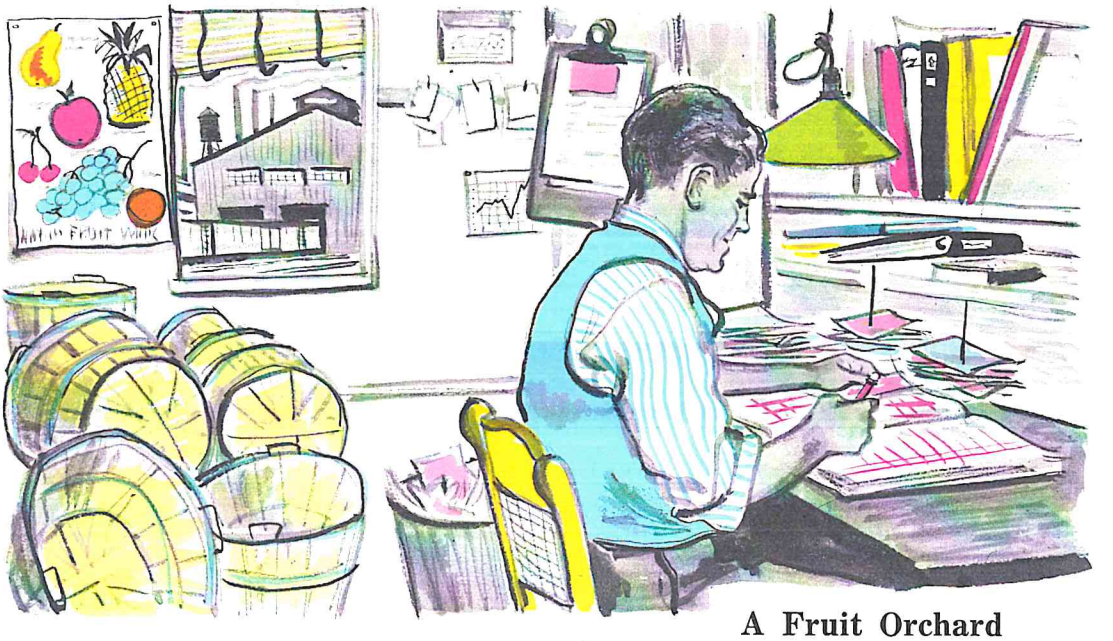
$$\begin{array}{r} 221 \\ \times 400 \\ \hline 88400 \end{array}$$

5.

312	430	206	700	608	940	561	875
300	200	400	500	700	600	800	300

6.

\$2.13	\$3.60	\$1.09	\$6.55	\$5.08	\$3.29	\$8.00
112	212	423	304	607	500	400



A Fruit Orchard

At the end of the season the clerk went over the sales slips to find out what had been sold during the fall. He learned that the following sales had been made:

325 bushels of number 1 peaches at $3.25 a bushel
175 bushels of number 2 peaches at $1.50 a bushel
619 bushels of apples at $1.98 a bushel
200 bushels of pears at $2.10 a bushel

Answer the following questions:

1. How much money was received for number 1 peaches?
2. How much money was received for number 2 peaches?
3. What was the total amount received for peaches?
4. What was the value of all of the apples?
5. What was the total value of all of the pears?
6. How many bushels of fruit were sold altogether?
7. What was the total value of all of the fruit sold?

Now you have learned:

- You multiply by *hundreds* in the same way that you multiply by *tens*, or by *ones*.

Problems to Solve

Read each problem carefully to learn what it tells you and what it asks you to find. Decide what you will do to solve the problem. Then find the answer for the problem question.

1. Mr. Austin delivers coal to a large factory building. If he can haul 3500 pounds on his truck in one load, how many pounds would he haul in 20 loads?

2. Bob's oldest brother has a job that pays $375 a month. How much money will he earn in a year?

3. Janet's father used 30 gallons of gasoline on a 270-mile trip with his truck. How many miles did he average per gallon?

4. Dan sold $1\frac{3}{4}$ dozen eggs to Mrs. Johnson and $\frac{3}{4}$ dozen to Mrs. Bell. How many dozen eggs did he sell altogether?

5. A newsboy sold 410 copies of the newspaper during a week. If he received $.02 for each copy sold, how much money did he earn?

6. Mrs. Adams bought 3 yards of cloth at $2.98 a yard. How much change should she get from $10?

7. Joan's father drives his car 28 miles each day as he travels to and from his work. If he drives 5 days each week for 50 weeks during the year, how many miles does he drive to and from his work during the year?

8. Jane and Joan want to buy a birthday gift for their mother. It costs $10. Jane has saved $3.98 and Joan has saved $4.25. How much more money do they need to save?

9. Last summer Dick sold sweet corn at $.36 a dozen ears. Three customers bought $1\frac{1}{2}$ dozen, 2 dozen, and $2\frac{1}{2}$ dozen. How much money did Dick get from the three customers?

10. Mr. Brown gathered 336 eggs in one day. At $.75 a dozen how much were the eggs worth?

11. John read about an airplane that weighed 52 tons. How many pounds did the plane weigh? (1 ton = 2000 lbs.)

Review and Practice

Find the answer for each problem and each example below.

1. If a city block is 660 feet by 660 feet, what is its area in square feet?

2. Betty is reading a book that contains 342 pages. She has read 185 pages. How many more has she to read?

3. A large truck uses a gallon of gasoline for each 6 miles it travels. How many gallons will the truck use on a trip of 2394 miles?

4. Betty's mother bought a bushel of potatoes for $2.69 and 5 pounds of meat at $.89 a pound. How much did she spend for both?

Subtract:

5.

$49.51	$90.78	$53.08	$79.00	$43.51	$60.00
27.64	59.99	32.69	39.45	15.64	14.25

Divide:

6. $3\overline{)693}$ $5\overline{)565}$ $8\overline{)976}$ $7\overline{)498}$ $6\overline{)5094}$ $28\overline{)84}$ $36\overline{)108}$

Add:

7.

21	560	268	6375	2468	14100	$3.07
43	279	9380	2143	1315	2070	2.25
69	534	509	5132	2752	25908	7.15
38	747	608	6151	1849	1046	9.32

Multiply:

8.

6489	2416	8965	8657	2437	300	536
2	5	6	32	65	800	405

9. Add 6597 to the product of 23 times 89.

10. What is the average of 450, 676, 390, and 468?

11. What is the sum of $2\frac{3}{8}$ and $5\frac{7}{8}$?

12. What is the difference between $\frac{3}{4}$ of 72 and $\frac{2}{3}$ of 75?

To Help You Remember

The page numbers after the questions tell you where to turn for help if you need it.

▶ *To think and talk about:*

1. Tell how you would multiply 20 × 462 the short way. (162)

2. Tell how you would multiply 102 × 528 the short way. (171)

3. How would you multiply 300 × 187 the short way? (171)

4. Explain how you would find distances on a map that is drawn to the scale of 1 inch = 10 miles. (156)

5. When you multiply 432 × 654 why are there no tens or ones in the third partial product? (171)

6. Explain what we mean by: dimensions (164), perimeter (165), area (166), and right angle. (164)

7. Explain the meaning of these terms: numerator (43), denominator (43), like fractions (129), proper fraction (134), improper fraction (134), mixed number (135), lowest terms (107).

8. Explain how to find the true quotient in 90 ÷ 15. (116)

▶ *To think about and write:*

1. Find the number of miles represented by 4 inches on a map that is drawn to the scale of 1 inch = 25 miles. (156)

2. Copy these sentences and add the missing words:

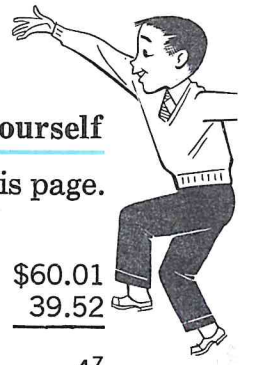
The distance around a garden is its _____. (165)
The length and width of a rectangle are its _____. (164)
The size of a surface is its _____. (166)
The corner of a square or a rectangle is a _____angle. (164)

3. Work these examples:

25 × 237 (162) 102 × 642 (171) 200 × 581 (171)

4872 ÷ 2 (86) 96 ÷ 32 (114) 67 ÷ 22 (118) 158 ÷ 26 (121)

$\frac{1}{4} + \frac{3}{4}$ (132) $\frac{5}{8} + \frac{5}{8}$ (136) $\frac{5}{9} - \frac{2}{9}$ (146) $\frac{7}{8} - \frac{5}{8}$ (146)



Testing Yourself

Find the answer for each example and problem on this page.

Subtract:

1.

\$98.85	\$75.00	\$51.95	\$29.46	\$80.43	\$60.01
28.67	62.34	15.59	28.78	67.89	39.52

2.

$\frac{2}{3}$	$\frac{5}{7}$	$\frac{3}{4}$	$\frac{5}{6}$	$\frac{4}{9}$	$\frac{7}{9}$	$\frac{5}{8}$	$2\frac{3}{5}$	6	$4\frac{7}{8}$
$\frac{1}{3}$	$\frac{2}{7}$	$\frac{1}{4}$	$\frac{1}{6}$	$\frac{2}{9}$	$\frac{4}{9}$	$\frac{3}{8}$	$1\frac{1}{5}$	$1\frac{1}{2}$	$1\frac{3}{8}$

Divide:

3. $4\overline{)848}$ $7\overline{)791}$ $5\overline{)830}$ $6\overline{)368}$ $3\overline{)2625}$ $37\overline{)74}$ $25\overline{)125}$

Add:

4.

62	243	260	5492	2156	5007	2689
20	178	342	6073	4327	9753	3879
47	695	7517	5280	6953	4028	4968
89	587	250	7045	3874	7509	4536

5.

$\frac{1}{3}$	$\frac{1}{5}$	$\frac{1}{8}$	$\frac{1}{12}$	$\frac{8}{15}$	$\frac{1}{10}$	$\frac{4}{9}$	$2\frac{1}{2}$	$3\frac{5}{6}$	$7\frac{8}{9}$
$\frac{1}{3}$	$\frac{2}{5}$	$\frac{5}{8}$	$\frac{5}{12}$	$\frac{4}{15}$	$\frac{3}{10}$	$\frac{5}{9}$	$1\frac{1}{2}$	$2\frac{5}{6}$	$1\frac{5}{9}$

Multiply:

6.

4257	5347	7546	6247	9783	459	768
3	4	22	43	57	300	263

Solve these problems:

7. The children in a school bought 329 books that cost \$1.65 each. How much money did all of the books cost?

8. In one year 1017 pupils enrolled in Lincoln School and 198 pupils withdrew. How many pupils were still in the school at the end of the year?

9. Mr. Davis earns \$69.50 in a 5-day week. How much does he earn per day?

10. Last summer Jack saved \$2.75 a week for 12 weeks. He then bought a used bicycle for \$19.95. How much of his savings did he have left?

Chapter 12

Saving Money

The children at Hay School bring money once a week to buy savings stamps and bonds. The children in the picture are counting the money and putting the smaller coins into rolls.

1. Sue had 500 pennies to put into rolls which held 50 pennies each. How many rolls of pennies did she have?

To solve the problem, you divide 500 by 50.

First you *change* 5 hundreds to 50 tens. Why?

Divide the 50 tens by 50 ones. Find the quotient by dividing the 5 in the dividend by the 5 in the divisor. Write 1 in tens' place in the quotient. *Multiply.* $1 \times 50 = 50$.

Bring down the 0 in ones' place. There are no ones to divide. Write 0 in ones' place in the quotient.

$$\begin{array}{r} 10 \\ 50\overline{)500} \\ 50 \\ \hline 0 \end{array}$$

2. Bob put 480 nickels into 12 equal rolls. How many did he put in each roll?

In this example 4 hundreds were changed to 40 tens and added to the 8 tens in the dividend.

$$\begin{array}{r} 40 \\ 12\overline{)480} \\ 48 \\ \hline 0 \end{array}$$

The 50 tens in the example above, and the 48 tens in this example are called *partial dividends*. Each is the part of the dividend you divide. The partial dividend is always as large, or larger, than the divisor.

Dividing Tens in Three-Place Numbers

1. Study the completed examples below. The 80 tens in example A, the 77 tens in example B, and the 49 tens in example C are the partial dividends. They are larger than the divisors.

A
```
   20 r 6
40)806
  80
   6
```

B
```
   30 r 20
25)770
  75
  20
```

C
```
   40 r 10
12)490
  48
  10
```

● The new thing in the examples above is that there are remainders. A remainder is always smaller than the divisor.

2. The remainder in example A is 6 ones. Why are the remainders in examples B and C two-place numbers? Is each remainder smaller than the divisor?

3. Why is there a zero in ones' place in the quotient of each example?

4. How do you find each trial quotient figure above?

Find the answers for the division examples below.

5. $90\overline{)900}$ $30\overline{)600}$ $22\overline{)880}$ $11\overline{)550}$ $13\overline{)390}$ $12\overline{)480}$

6. $30\overline{)904}$ $43\overline{)866}$ $21\overline{)639}$ $31\overline{)950}$ $21\overline{)650}$ $42\overline{)870}$

7. $11\overline{)890}$ $13\overline{)270}$ $12\overline{)490}$ $32\overline{)984}$ $26\overline{)792}$ $47\overline{)973}$

In the next two rows the trial quotient figure is not the true one. Sometimes there are remainders. Find the answers.

8. $15\overline{)300}$ $13\overline{)780}$ $14\overline{)840}$ $17\overline{)510}$ $16\overline{)800}$ $18\overline{)720}$

9. $12\overline{)605}$ $17\overline{)346}$ $15\overline{)310}$ $14\overline{)990}$ $19\overline{)777}$ $18\overline{)916}$

Now you have learned:

◑ When the divisor and the partial dividend are two-place numbers, divide the first figure in the partial dividend by the first figure in the divisor to find the trial quotient figure.

Dividing Tens and Ones in Three-Place Numbers

1. Harvey picked 13 watermelons that weighed 143 pounds in all. What was the average weight per melon?

Divide to find the answer.

Change the hundreds to tens.
Divide tens. *Multiply* and *subtract.*
Bring down the ones.
Change the tens left to ones.
Divide ones and *multiply.*

The *first partial dividend* is 14 tens because 14 tens is the first number you divide. 13 ones is the *second partial dividend.* Do you see why?

$$13\overline{)143}$$

$$\begin{array}{r} 1 \text{ ten} \\ 13\overline{)14 \text{ tens}} \\ \underline{13} \\ 1 \text{ ten} \end{array}$$

$$\begin{array}{r} 1 \text{ one} \\ 13\overline{)13 \text{ ones}} \\ \underline{13} \end{array}$$

$$= \quad \begin{array}{r} 11 \\ 13\overline{)143} \\ \underline{13} \\ 13 \\ \underline{13} \end{array}$$

How do you find the trial quotient figure for each partial dividend? Why is 1 ten a true quotient figure? Why is 1 one a true quotient figure?

What was the average weight per melon?

Copy the examples below and divide. Check your work.

2. $30\overline{)690}$ $20\overline{)860}$ $60\overline{)660}$ $40\overline{)480}$ $20\overline{)640}$ $30\overline{)990}$

3. $32\overline{)992}$ $41\overline{)861}$ $21\overline{)672}$ $25\overline{)575}$ $36\overline{)756}$ $45\overline{)990}$

4. $10\overline{)770}$ $11\overline{)891}$ $11\overline{)726}$ $12\overline{)888}$ $14\overline{)448}$ $16\overline{)496}$

5. $14\overline{)994}$ $13\overline{)949}$ $15\overline{)630}$ $17\overline{)884}$ $16\overline{)848}$ $19\overline{)988}$

The examples below have remainders in the answers. Study the example worked for you.

$$\begin{array}{r} 31 \text{ r } 6 \\ 32\overline{)998} \\ \underline{96} \\ 38 \\ \underline{32} \\ 6 \end{array}$$

6. $20\overline{)684}$ $50\overline{)552}$ $33\overline{)697}$ $42\overline{)885}$ $60\overline{)666}$

7. $38\overline{)799}$ $24\overline{)986}$ $42\overline{)506}$ $35\overline{)738}$ $47\overline{)988}$

8. $10\overline{)964}$ $11\overline{)898}$ $12\overline{)985}$ $13\overline{)976}$ $14\overline{)996}$

Problem and Example Practice

1. Mr. Brown gathered 648 eggs in a week. How many cartons can he fill if each carton holds 1 dozen eggs?

2. At an average speed of 50 miles an hour, how many hours will it take a train to travel 550 miles?

3. A farmer had 780 pounds of potatoes to put into bags which held 15 pounds each. How many bags could he fill?

4. A class of 25 pupils had 525 tickets to sell. On the average, how many tickets should each pupil sell?

5. Dick sold 984 papers in 12 days. What were his average sales per day?

6. Mr. Wade's car averages 17 miles per gallon of gas. How many gallons of gas will he use on a trip of 884 miles?

7. Mr. Nelson used 14 gallons of gasoline on a 252-mile trip. How many miles did he average per gallon?

8. Julie had 66 beads. She decided to put 33 beads on each string. How many strings did she use?

9. If 10 boys collected 380 pounds of old newspapers what was the average number of pounds collected per boy?

Find the answers for these examples:

10.	$30\overline{)604}$	$24\overline{)967}$	$48\overline{)967}$	$12\overline{)726}$	$27\overline{)816}$	$53\overline{)536}$
11.	$43\overline{)870}$	$35\overline{)720}$	$23\overline{)701}$	$42\overline{)867}$	$53\overline{)564}$	$15\overline{)611}$
12.	$20\overline{)460}$	$24\overline{)768}$	$13\overline{)559}$	$18\overline{)918}$	$31\overline{)997}$	$22\overline{)949}$
13.	$15\overline{)789}$	$16\overline{)500}$	$46\overline{)968}$	$62\overline{)697}$	$25\overline{)329}$	$36\overline{)778}$
14.	$34\overline{)748}$	$13\overline{)273}$	$26\overline{)806}$	$24\overline{)528}$	$25\overline{)550}$	$24\overline{)744}$
15.	$21\overline{)674}$	$42\overline{)885}$	$45\overline{)948}$	$36\overline{)398}$	$45\overline{)496}$	$36\overline{)758}$

Dividing More Three-Place Numbers

1. Mr. Thompson's car travels 16 miles on a gallon of gas. How many gallons will he need for a trip of 928 miles?

Divide to solve the problem.

Change the hundreds to tens.
Divide tens. *Multiply* and *subtract.*
Bring down the ones.
Change the hundreds and tens that are left to ones.
Divide ones and *multiply.*

$$16\overline{)928} = \begin{array}{r} 5 \text{ tens} \\ 16\overline{)92} \text{ tens} \\ 80 \\ \hline 12 \end{array} \quad \begin{array}{r} 8 \text{ ones} \\ 16\overline{)128} \text{ ones} \\ 128 \\ \hline \end{array} \quad = \quad \begin{array}{r} 58 \\ 16\overline{)928} \\ 80 \\ \hline 128 \\ 128 \\ \hline \end{array}$$

The second partial dividend is 128. To find the trial quotient figure, divide the 12 in the dividend by the 1 in the divisor. You get 12. You know that a trial quotient should not be more than 9. Try 9. 9 is too large. Try 8. 8 is the true quotient figure. Can you tell why?

Find the answers for the examples below. Check your work.

2. $50\overline{)650}$ $70\overline{)840}$ $23\overline{)874}$ $32\overline{)800}$ $37\overline{)703}$ $13\overline{)767}$

3. $60\overline{)960}$ $41\overline{)984}$ $63\overline{)882}$ $79\overline{)948}$ $31\overline{)806}$ $18\overline{)666}$

Study the example at the right. Then find and check the answers for these examples:

$$43\overline{)999} \quad \begin{array}{r} 23 \text{ r}10 \\ 86 \\ \hline 139 \\ 129 \\ \hline 10 \end{array}$$

4. $20\overline{)598}$ $31\overline{)750}$ $45\overline{)600}$ $33\overline{)659}$

5. $11\overline{)983}$ $13\overline{)880}$ $14\overline{)837}$ $12\overline{)479}$

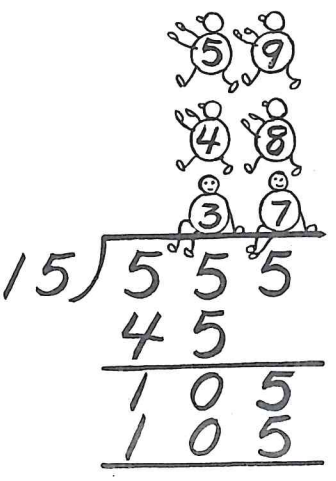
6. $50\overline{)745}$ $67\overline{)845}$ $25\overline{)897}$ $35\overline{)806}$

Now you have learned:

To find the trial quotient when the divisor is a two-place number and the partial dividend is a three-place number, divide the first two figures in the partial dividend by the first figure in the divisor.

Practice in Division

Look at the cartoon illustration below. Why are figures 5 and 4 walking away? Why is figure 3 sitting in tens' place in the quotient? Why are figures 9 and 8 walking away from ones' place?



Divide and check:

1.	30)600	28)845	31)936	14)980
2.	12)725	15)609	40)840	21)855
3.	32)970	18)730	19)964	17)961
4.	30)960	42)882	24)792	12)648
5.	40)860	35)753	23)970	16)998
6.	50)700	79)948	42)966	15)705
7.	60)845	28)985	31)659	17)780	14)553	19)489
8.	38)971	21)379	86)983	26)673	12)463	43)986

Solve these problems:

9. John's mother needs 480 envelopes to use in mailing notices about a meeting. She buys them in packages of 24. How many packages of envelopes should she buy?

10. Mrs. Johnson drove her car 300 miles the first 15 days of December. How many miles did she average per day?

11. During the 20 school days in November the owner of the school store sold 620 pencils. What was the average number of pencils sold per day?

12. Ann is reading a book about trains. She read about one train that traveled 765 miles in 15 hours. What was the average speed per hour?

13. A farmer raised 640 bushels of oats on a 20-acre field. How many bushels did he average per acre?

Changing Measures of Length

To solve each problem below you will need to change measures of length to fewer larger units or to more smaller units. Solve the problems.

1. Harold is 5 feet tall. Jerry is 60 inches tall. Which boy is taller?

To answer the question you must change feet to inches.

Multiply 12 inches by 5. Why? 5×12 in. $= 60$ in.

Each boy is 60 inches tall.

2. Joe's father is 5 feet, 11 inches tall. How many inches tall is he?

To find the answer, you change feet to inches and add inches to inches.

3. Nancy wants to cut 3 yards of ribbon into 9 equal pieces. How many inches long should she make each piece?

4. How many yards of linoleum are needed to cover a table 72 inches long?

To answer the question, you must change inches to yards.

Divide 72 in. by 36 in. Why? 72 in. $\div$ 36 in. $= 2$.

5. How many feet long is a table that is 60 inches long?

6. If a rug is 12 feet long, what is its length in yards?

7. If the distance around a box is 72 inches, how many feet is it around the box?

8. George cut a piece 4 feet long from a board 55 inches long. How many inches of the board were left?

9. How many yards wide is a window that is 6 feet wide?

10. Jerry's home is on a lot 75 feet wide and 150 feet long. What are the dimensions of the lot in yards?

You will remember:

◐ *Multiply to change large* units of measure *to smaller* units. *Divide to change small* units of measure *to larger* units.

Reviewing Measures of Counting

Use the table at the right below to help you answer the questions in these problems. Find the answers.

12 things = 1 dozen
12 dozen = 1 gross

1. Mrs. White telephoned an order to the grocery store for $1\frac{1}{2}$ dozen oranges. How many oranges should she get?

2. Mrs. Adams ordered $2\frac{1}{2}$ dozen cookies from the bakery. How many cookies should she get?

3. Mr. Black had 120 dozen eggs in stock at his grocery store. How many gross of eggs did he have?

4. Eggs cost 68¢ a dozen. Mrs. Green bought $\frac{1}{2}$ of a dozen. How much should she pay for the half dozen eggs?

5. The school store bought 2 gross of pencils to sell to the children. How many pencils did the store buy?

6. In a week the store sold 5 dozen of the pencils. How many dozen pencils did the store have left?

7. Mrs. Johnson bought two 1-pound cans of coffee at 85¢ a can and a half-pound can for 45¢. How much did she pay?

8. Mrs. Miller bought $\frac{1}{2}$ of a pound of liver sausage and $\frac{1}{2}$ of a pound of summer sausage. How much sausage did she buy?

9. Jack helped the grocer put 6 dozen eggs into cartons that held $\frac{1}{2}$ dozen each. How many cartons did they fill?

Fractions in Measures

1. One quart equals what fraction of 1 gallon? To find the answer, think of 1 gallon as 4 quarts. Then the question becomes: 1 quart is equal to what fraction of 4 quarts? The answer is $\frac{1}{4}$. 1 qt. = $\frac{1}{4}$ of 4 qt.; so 1 qt. = $\frac{1}{4}$ of 1 gal.

2. Three quarts equal what fraction of 1 gallon? Think: 1 gal. = 4 qt. 3 qt. = $\frac{3}{4}$ of 4 qt.; so 3 qt. = $\frac{3}{4}$ of 1 gal.

What fraction belongs where you see a question mark? Be sure that your answer is in lowest terms.

3. 6 things = $\frac{1}{2}$ of 1 doz. 4 things = ? of 1 doz.

4. 8 things = ? of 1 doz. 12 things = ? of 1 doz.

5. 9 things = ? of 1 doz. 10 things = ? of 1 doz.

6. 1 in. = ? of 1 ft. 3 in. = ? of 1 ft.

7. 4 in. = ? of 1 ft. 10 in. = ? of 1 ft.

8. 6 in. = ? of 1 ft. 12 in. = ? of 1 yd.

9. 6 in. = ? of 1 yd. 9 in. = ? of 1 yd.

10. 1 oz. = ? of 1 lb. 2 oz. = ? of 1 lb.

11. 4 oz. = ? of 1 lb. 7 oz. = ? of 1 lb.

12. 8 oz. = ? of 1 lb. 2 qt. = ? of 1 gal.

13. 2 pk. = ? of 1 bu. 1 pt. = ? of 1 qt.

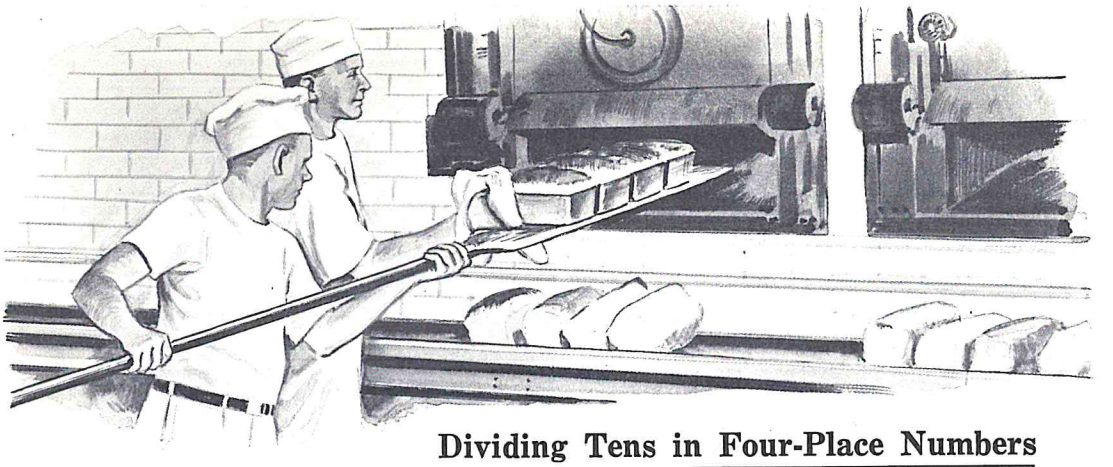
Solve the problems below.

14. Which is cheaper, 2 quarts of milk at 19¢ a quart or a half gallon of milk for 35¢?

15. Janet cut a piece of ribbon 15 inches long from a piece $\frac{1}{2}$ of a yard long. How much ribbon was left?

16. Nancy wanted to make a scarf. She bought $\frac{2}{3}$ of a yard of cloth priced at $.69 a yard. How much did it cost?

17. Jim went to the post office for his mother. He wanted to mail a letter that weighed 3 ounces. At 3¢ per ounce, how much postage would be required for the letter?



Dividing Tens in Four-Place Numbers

1. At his bakery, Mr. Hill sold 1050 loaves of bread in 15 days. Find the average number of loaves he sold per day.

Divide to find the answer.

Change 1 thousand to 10 hundreds. *Change* 10 hundreds to 100 tens. *Divide* 105 tens by 15. *Multiply.*

Bring down 0 in ones' place. There are no ones to divide.

How do you find the trial quotient for the example?

What is the answer?

$15\overline{)1050}$

$15\overline{)105}$ tens — 7 tens

105

0 ones

$15\overline{)0}$ ones

0

$=$

$15\overline{)1050}$ — 70

105

0

Copy, divide, and check. In some of the answers there will be remainders of ones:

2. $30\overline{)1200}$ $43\overline{)1720}$ $69\overline{)2070}$ $74\overline{)4440}$ $85\overline{)7650}$

3. $50\overline{)1001}$ $70\overline{)3505}$ $37\overline{)1116}$ $64\overline{)3209}$ $26\overline{)1304}$

4. $13\overline{)1170}$ $15\overline{)1350}$ $18\overline{)1620}$ $16\overline{)1280}$ $14\overline{)1120}$

5. $14\overline{)1267}$ $17\overline{)1539}$ $19\overline{)1715}$ $12\overline{)1086}$ $15\overline{)1204}$

Sometimes there are remainders of tens, or tens and ones.

6. $30\overline{)1210}$ $46\overline{)1390}$ $67\overline{)2700}$ $16\overline{)1130}$ $17\overline{)1370}$

7. $26\overline{)1319}$ $34\overline{)1725}$ $52\overline{)1086}$ $13\overline{)1051}$ $14\overline{)1273}$

Dividing Tens and Ones in Four-Place Numbers

1. Mr. Ware paid \$13.32 for 18 pounds of meat to use at a picnic. How much did he spend per pound for the meat?

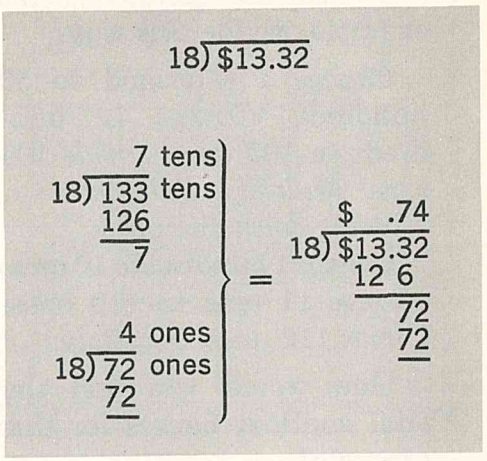
In this example you will find that both the tens and the ones can be divided.

Find the answer this way:

Change 1 thousand to 10 hundreds. *Change* 13 hundreds to 130 tens. *Divide* 133 tens. *Multiply*. *Subtract*.

Bring down the 2 ones.

Change the 7 tens that are left to 70 ones. *Divide* 72 ones. *Multiply*.



How do you find the trial quotient for each of the two partial dividends?

What is the answer to the problem question?

Copy and divide. Check your answer:

2. 20)1080 70)2170 30)1890 60)3060 40)2880

3. 57)1767 43)2666 29)1218 37)1184 63)2583

4. 15)1215 12)1104 17)1258 14)1162 18)1314

5. 16)1152 13)1196 18)1674 15)1380 12)1008

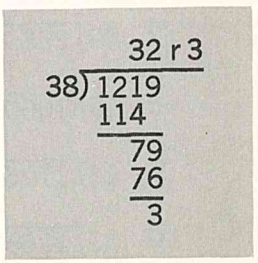
In the answer for each example below there will be a remainder of ones, as shown at the right.

6. 50)3058 40)1658 26)1329 42)1346

7. 39)1600 68)1434 53)1117 61)1896

8. 12)1005 16)1159 11)1006 17)1259

9. 13)1068 18)1137 14)1318 19)1429



More about Dividing Four-Place Numbers

1. Study the example at the right below. You will discover that both partial dividends are three-place numbers.

To find the answer for this example, divide this way:

Change 1 thousand to 10 hundreds. *Change* 10 hundreds to 100 tens. *Divide* 109 tens. *Multiply*. *Subtract*.

Bring down the ones.

Change 1 hundred to 10 tens. *Change* 11 tens to 110 ones. *Divide* 112 ones. *Multiply*.

How would you find the trial quotient figures for this example?

$$14\overline{)1092}$$

7 tens
$14\overline{)109}$ tens
98
11 tens

8 ones
$14\overline{)112}$ ones
112

$=$

$$14\overline{)1092}\quad 78,\ 98,\ 112,\ 112$$

Copy the examples below and divide. Check your work.

2. $20\overline{)1180}$ $90\overline{)1980}$ $50\overline{)2300}$ $46\overline{)1058}$ $38\overline{)1634}$

3. $82\overline{)1066}$ $29\overline{)1276}$ $66\overline{)2112}$ $32\overline{)1120}$ $73\overline{)1752}$

4. $19\overline{)1273}$ $16\overline{)1424}$ $13\overline{)1014}$ $15\overline{)1020}$ $18\overline{)1206}$

5. $17\overline{)1479}$ $12\overline{)1188}$ $19\overline{)1064}$ $14\overline{)1372}$ $16\overline{)1248}$

The answers for the examples below have remainders such as the one you see in the completed example at the right.

6. $70\overline{)1085}$ $50\overline{)1639}$ $30\overline{)1382}$ $26\overline{)1499}$

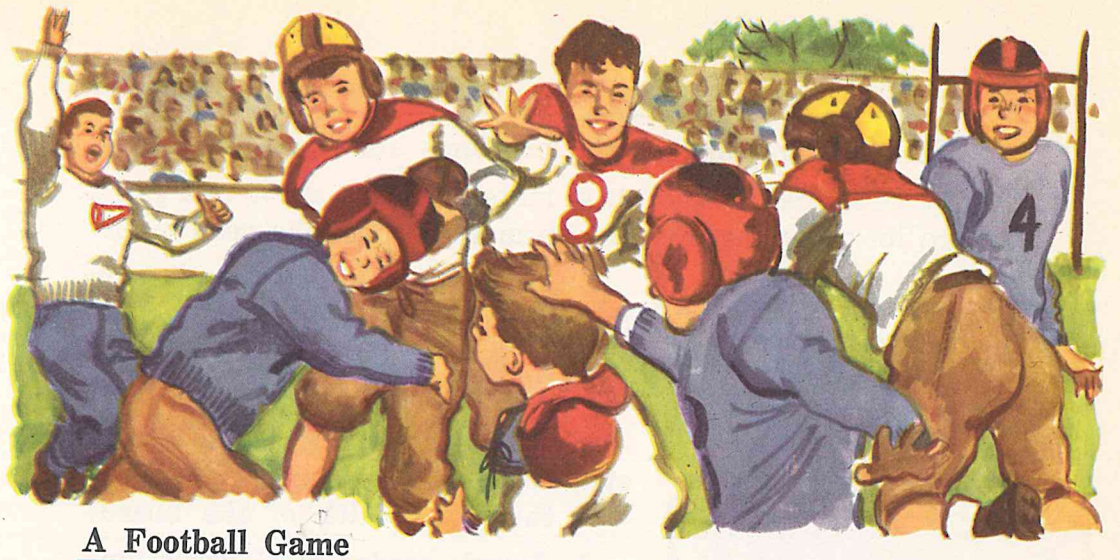
7. $49\overline{)2589}$ $61\overline{)2087}$ $99\overline{)1390}$ $84\overline{)1945}$

8. $15\overline{)1000}$ $13\overline{)1277}$ $18\overline{)1380}$ $14\overline{)1369}$

9. $12\overline{)1196}$ $19\overline{)1488}$ $16\overline{)1103}$ $15\overline{)1303}$

10. $31\overline{)1369}$ $42\overline{)2678}$ $18\overline{)1376}$ $35\overline{)1587}$

$$45\overline{)1947}\quad 43\text{ r }12,\ 180,\ 147,\ 135,\ 12$$



A Football Game

The picture shows the home team and the visitors in last year's championship game. This table tells about the game:

	Visitors	Home Team
First downs	13	18
Rushing yardage	178	107
Passing yardage	105	165
Passes attempted	15	37
Passes completed	7	15
Passes intercepted	3	2
Yards penalized	70	60
Score	27	31

Use the table above to help you answer the questions.

1. Which team won the game?

2. How many yards gain did the visitors make in all?

3. How many more yards were gained by the visitors than by the home team?

4. What was the average number of yards made by the visitors per pass completed?

5. What was the average number of yards made by the home team per pass completed?

Fractions in Problems and Examples

Find the answers for the problems and examples below.

1. Betty needs $1\frac{1}{3}$ yards of material for an apron and $\frac{1}{3}$ of a yard for trimming. How much material does she need in all?

2. Bob rode the bus $4\frac{3}{5}$ miles on the way to Larry's home. He walked another $\frac{4}{5}$ of a mile. How many miles did he travel in all?

3. Dick's father glued a $\frac{3}{4}$-inch strip to a board $6\frac{1}{4}$ inches wide. What was the total width of the board?

4. Jerry's garden is $3\frac{1}{3}$ yards long and $5\frac{2}{3}$ yards wide. What is the perimeter of the garden?

5. Jim's father harvested $3\frac{1}{4}$ bushels of potatoes from one row in his garden and $2\frac{1}{4}$ bushels from another. How many bushels of potatoes did he harvest?

6. June watched television $1\frac{5}{6}$ hours on Saturday and $1\frac{1}{6}$ hours on Sunday. How many more hours did she watch television on Saturday than on Sunday?

7. Judy used one piece of cardboard $9\frac{5}{8}$ inches long and a second piece $7\frac{7}{8}$ inches long to make posters. How many inches longer was the first piece than the second?

8. Bertha's mother bought 2 chickens at the meat market. One weighed $4\frac{1}{8}$ pounds and the other weighed $3\frac{3}{8}$ pounds. What was the difference between their weights?

Find the sums:

9.

$3\frac{1}{5}$	$4\frac{1}{3}$	$8\frac{2}{7}$	$6\frac{3}{4}$	$9\frac{1}{6}$	$6\frac{5}{16}$	$4\frac{1}{12}$	$2\frac{5}{8}$
$+\ 2\frac{1}{5}$	$+\ 9\frac{1}{3}$	$+\ 9\frac{4}{7}$	$+\ 5\frac{1}{4}$	$+\ 8\frac{5}{6}$	$+\ 7\frac{3}{16}$	$+\ 3\frac{5}{12}$	$+\ 1\frac{5}{8}$

Find the differences:

10.

$4\frac{2}{7}$	$8\frac{8}{9}$	$5\frac{4}{5}$	3	$6\frac{3}{8}$	$9\frac{3}{4}$	$8\frac{7}{9}$	$4\frac{1}{4}$
$-\ 2\frac{1}{7}$	$-\ 1\frac{7}{9}$	$-\ 3\frac{2}{5}$	$-\ \frac{1}{3}$	$-\ 2\frac{1}{8}$	$-\ \frac{1}{4}$	$-\ 2\frac{4}{9}$	$-\ 2\frac{3}{4}$

Making Sure of Division

Find and check the answers for the examples in each row.

1.	20)1400	34)1365	58)1163	13)1040	16)1127
2.	70)2150	21)1490	65)1318	15)1060	18)1095
3.	20)1640	34)1768	58)1334	18)1332	16)1008
4.	50)1551	46)1017	62)1990	12)1119	19)1122
5.	40)1551	79)1738	91)1183	16)1104	14)1246
6.	60)1385	83)1090	58)1859	17)1183	13)1280

Solve these problems:

7. A truckload of wheat weighed 4800 pounds. How many 60-pound bags of wheat were there on the truck?

8. The 34 children in a fifth-grade class collected 1725 used stamps. If they share them equally, how many stamps should each child have and how many stamps will be left?

9. Jim's father is planning a 2880-mile trip. If he drives at an average speed of 40 miles an hour, how many hours of driving will the trip take?

10. Mr. Wright gathered 1005 eggs in February. He packed them into cartons of 1 dozen each. How many cartons did he fill and how many eggs were left?

11. Tom and his father went on a 2100-mile automobile trip. The total driving time was 50 hours. What was the average number of miles traveled per hour?

12. Mr. Adams harvested 1722 bushels of corn from a 42 acre field. What was the average number of bushels per acre?

13. Mr. Robinson bought 1000 cabbage plants to put in one of his fields. He plans to put 15 plants in a row. How many rows of plants will he have and how many plants will be left over?

Problems to Solve

Read each problem and decide what you will do to answer the question it asks. Then find the answer.

1. Mr. Johnson sold 1040 boxes of apples in 20 days. What was the average number of boxes of apples sold per day?

2. The 62 children in two fifth-grade classes plan to make 682 programs for the music festival. What is each child's share?

3. Jack tried on one suit that cost $29. Another suit cost $24.75. How much less was the second suit?

4. The Junior Red Cross members plan to pack 25 boxes of gifts to send overseas. They have 278 small toys to pack. How many toys should they put into each box and how many toys will be left?

5. Bob's father bought a tire for $18.50. A second tire cost half as much. How much did both tires cost?

6. The 32 fifth graders bought 992 savings stamps. At 10¢ a stamp, what was the average amount saved per pupil?

7. Janet's mother can buy a coat regularly priced at $95.98 for just half price. What is the cost of the coat?

8. A greenhouse owner cut 735 roses to sell. He packed them into boxes that held 2 dozen roses each. How many boxes did he fill and how many roses were left?

9. The 15 Girl Scouts need $2.70 to buy a present for their leader. How much money should each girl bring?

10. Jane bought $1\frac{1}{2}$ dozen chocolate bars and $2\frac{1}{2}$ dozen coconut bars. How many candy bars did she buy?

11. The pupils earned $14.70 selling 35 bundles of paper. What was the average price per bundle?

Add, Subtract, Multiply, or Divide?

Read each problem and decide how you will solve it. Write A, S, M, or D to show how you will find the answer. Then find the answer.

1. A milk driver delivered 3248 quarts of milk in 7 days. What is the average number of quarts delivered per day?

2. An article in the newspaper said that 8500 workers were needed to harvest the cherry crop in Wisconsin. Only 3125 workers were available. How many more workers were needed to harvest the cherry crop?

3. Six boys worked together and earned $13.80. What was each boy's share of the money?

4. Dick and his father have a garden. They spent $12.50 for seeds and plants and $4.75 for fertilizer. How much change should they receive from a $20 bill?

5. Dick sold Mrs. Brown vegetables and berries for $3.78. Mrs. Ritter bought $4.85 worth, and Mrs. Miller bought $3.25 worth. How much money did Dick get altogether?

6. Dick picked 48 tomatoes. He put them into boxes that held 12 tomatoes each. If he sells them at $.75 a box, how much money will he have?

7. Tom's uncle harvested 168 bushels of potatoes from an acre of ground. At this rate how many bushels would he get from 18 acres?

8. Betty used $\frac{1}{3}$ of a cup of sugar in making chocolate cookies and $\frac{2}{3}$ of a cup in making white cookies. How many cups of sugar did Betty use in all?

9. Nancy bought 5 dozen plain doughnuts and $\frac{1}{3}$ of a dozen chocolate covered doughnuts. How many dozen doughnuts did she buy?

10. Jim caught a fish weighing $5\frac{3}{4}$ pounds and his father caught one weighing $2\frac{3}{4}$ pounds. How many pounds heavier was Jim's fish than his father's?

Review and Practice

Find the answers for the examples below. Watch the signs.

1. 56×9 ; $930 - 398$; $\$4.75 \times 30$; 1218×23 ; $5\overline{)\$4.90}$; $2\frac{1}{7} + 4\frac{1}{7}$; $7 - \frac{3}{4}$

2. $\$.80 \times 70$; $8\overline{)79}$; $300 - 192$; 7042×56 ; $6\frac{5}{6} - 3\frac{1}{6}$; 593×68 ; $784 - 397$

3. $\$1.08 + 5.00 + .49 + 6.08 + 2.30$; $3\overline{)609}$; 3007×90 ; $\$31.35 + 14.98 + 42.63 + 99.99 + 34.52$; $4\frac{5}{8} + 3\frac{5}{8}$; $1\frac{3}{8} - \frac{7}{8}$; $2\overline{)9517}$; $\$42.53 - 31.67$

4. $562 + 324 + 179 + 814 + 687$; 897×6 ; $7\overline{)88}$; 9648×46 ; $\$56.40 - 7.75$; $\$.05\overline{)\$89.70}$; $4\overline{)\$99.76}$; 1048×8 ; 654×363 ; $37\overline{)1296}$; 43×56

5. $\$6.05 - .49$; $6\overline{)685}$; $260 + 5703 + 400 + 89 + 41$; $\$82.03 - 15.36$; 750×500 ; 432×53 ; 879×246 ; $\$72.93 - 36.47$; 6435×7 ; $763 - 685$; $39\overline{)1677}$

Answer these questions:

6. What is the sum in $16 + 5 = 21$?

7. What is the dividend in $54 \div 9 = 6$?

8. What is the subtrahend in $601 - 17 = 584$?

9. What is the multiplier in $9 \times 7 = 63$?

10. Why is $2\frac{3}{4}$ called a mixed number?

11. What kind of fraction is $\frac{7}{5}$?

12. How do you change $\frac{7}{5}$ to a mixed number?

13. How do you change $\frac{6}{8}$ to lowest terms?

To Help You Remember

The page numbers after the questions tell you where to turn for help if you need it.

▶ *To think and talk about:*

1. How would you find the quotient in the following example? 400 ÷ 40. (177)

2. In the example 154 ÷ 14, what is the first partial dividend? The second partial dividend? (179)

3. What is the first trial quotient figure in the example 1184 ÷ 16? Can the true quotient figure be larger than 9? What is the first true quotient figure in the example? (116, 187)

4. Explain how to change larger units of measure to smaller units and smaller units of measure to larger units. (183)

5. Name some things that are measured by counting. (184)

6. When the fraction in the subtrahend is larger than the fraction in the minuend, what must you do before you can subtract? (150)

7. When the sum of fractions is larger than 1, what do you do? (135)

8. Tell how to write 1955 in Roman numbers. (66)

▶ *To think about and write:*

Find the answers for these examples. Watch the signs.

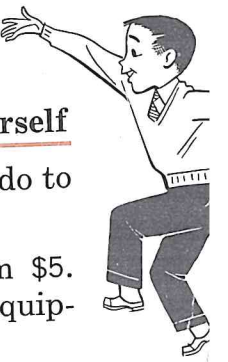
1. $18\overline{)918}$ (179) **2.** $16\overline{)1315}$ (187) **3.** $52\overline{)1864}$ (188)

4. $\frac{1}{7} + \frac{2}{7}$ (129) **5.** $4\frac{1}{5} + 2\frac{4}{5}$ (139) **6.** $1\frac{9}{10} + 2\frac{9}{10}$ (139) **7.** $\frac{5}{6} - \frac{1}{6}$ (146) **8.** $4\frac{7}{8} - 1\frac{5}{8}$ (148)

9. $5 - \frac{1}{3}$ (149) **10.** 32×30 (88) **11.** $6445 - 1768$ (71) **12.** 27×65 (100)

13. 322×200 (171) **14.** $8576 + 1439$ (68) **15.** $\$4.26 \times 21$ (162) **16.** 254×312 (171)

17. $\$46.58 + \$3.77 + \$.40 = ?$ (75) **18.** $\frac{3}{4}$ of $268 = ?$ (45)



Testing Yourself

Read each problem carefully. Decide what you should do to answer the question it asks. Then find the answer.

1. John had \$3.19 in his bank. His uncle gave him \$5. How much more money did he need to buy football equipment that cost \$10?

2. The children can get ice cream for their picnic in gallon cans at \$2.00 a gallon or in quart bricks at \$.55 a quart. How much will they save on each quart by getting the ice cream in gallon cans?

3. Roy had 39 savings stamps worth 25¢ each. He spent \$2.25 for more 25¢ savings stamps. How many stamps did he have altogether?

4. Walter had \$7.00. He bought a pair of shoes for \$6.75. He asked to have his change in nickels. How many nickels should the clerk give him?

5. Betty's mother paid \$5.50 for two roasting chickens. One weighed $5\frac{1}{4}$ pounds and the other weighed $4\frac{3}{4}$ pounds. What was the cost per pound?

6. Janet weighs 72 pounds. Mary weighs 69 pounds. How much more than Mary does Janet weigh?

Find the answers. Watch the signs.

7.

721	325	4670	6590	\$26.59	\$35.61
432	369	731	439	13.76	27.63
615	192	57	7651	4.82	33.99
762	914	2638	879	.63	5.95
+394	+716	+394	+4215	+34.21	+15.61

8.

39	763	1726	56	64	743	439	2516
×5	×8	×6	×30	×23	×45	×527	×32

9.

765	500	\$9.63	\$15.62	\$42.50	3	$5\frac{3}{8}$
−97	−262	−7.25	−8.63	−37.47	$-\frac{2}{5}$	$-\frac{5}{8}$

10. $60\overline{)180}$ $17\overline{)347}$ $26\overline{)792}$ $16\overline{)838}$ $49\overline{)1380}$ $17\overline{)\$12.92}$

Chapter 13

Equal Fractions

Study the picture above. Then answer these questions:

1. 8 = how many groups of 4? 8 = how many groups of 2? Are there twice as many 2's as there are 4's in the picture?

You can see that $\frac{1}{2}$ of 8 is 2 times as large as $\frac{1}{4}$ of 8. Then $\frac{1}{2} = \frac{2}{4}$. To change $\frac{1}{2}$ to $\frac{2}{4}$, you multiply both terms (the numerator and the denominator) of $\frac{1}{2}$ by 2. You get twice as many parts that are each half as large.

$\frac{1}{2}$ of 8 means 1 of the 2 equal groups into which 8 things have been divided. $\frac{2}{4}$ of 8 means 2 of the 4 equal groups into which 8 things have been divided.

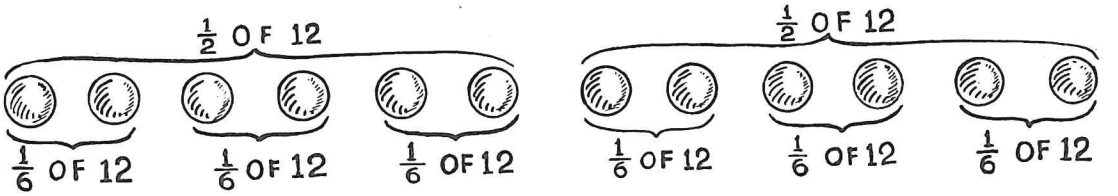
You can see that $\frac{1}{2}$ and $\frac{2}{4}$ are *equal fractions* because $\frac{1}{2}$ of a number is equal to $\frac{2}{4}$ of the same number.

Prove these statements:

2. $\frac{1}{2}$ of 12 in. = $\frac{2}{4}$ of 12 in.

3. $\frac{1}{2}$ of 16 marbles = $\frac{2}{4}$ of 16 marbles.

4. $\frac{1}{2}$ of 20 children = $\frac{2}{4}$ of 20 children.



Changing Fractions to Higher Terms

Janet wanted to find the answer to the question: $\frac{1}{2} = \frac{?}{6}$.

1. Study the illustration above. 12 = how many 6's? 12 = how many 2's? You can see that 12 = 3 times as many 2's as 6's. Notice that $\frac{1}{2}$ of 12 is 3 times as large as $\frac{1}{6}$ of 12.

To change $\frac{1}{2}$ to $\frac{3}{6}$, you multiply both terms of $\frac{1}{2}$ by 3 as shown at the right. You get three times as many parts that are each one third as large.

$$\frac{3 \times 1}{3 \times 2} = \frac{3}{6} \text{ so } \frac{1}{2} = \frac{3}{6}$$

2. What does $\frac{1}{2}$ of 12 mean? $\frac{3}{6}$ of 12? Are $\frac{1}{2}$ and $\frac{3}{6}$ equal fractions? Why?

3. Now look at this example: $\frac{1}{3} = \frac{?}{12}$. Why do you multiply both terms of $\frac{1}{3}$ by 4 to answer the question?

Answer these questions:

4. $\frac{1}{4} = \frac{?}{12}$ $\quad \frac{3}{4} = \frac{?}{12}$ $\quad \frac{1}{4} = \frac{?}{8}$ $\quad \frac{3}{4} = \frac{?}{8}$ $\quad \frac{1}{4} = \frac{?}{16}$ $\quad \frac{3}{4} = \frac{?}{16}$

5. $\frac{1}{3} = \frac{?}{9}$ $\quad \frac{2}{3} = \frac{?}{9}$ $\quad \frac{1}{3} = \frac{?}{6}$ $\quad \frac{2}{3} = \frac{?}{6}$ $\quad \frac{1}{3} = \frac{?}{15}$ $\quad \frac{2}{3} = \frac{?}{15}$

6. $\frac{1}{2} = \frac{?}{12}$ $\quad \frac{1}{5} = \frac{?}{10}$ $\quad \frac{2}{5} = \frac{?}{10}$ $\quad \frac{3}{5} = \frac{?}{10}$ $\quad \frac{1}{5} = \frac{?}{15}$ $\quad \frac{3}{5} = \frac{?}{15}$

Prove that:

7. $\frac{1}{2}$ of 18 = $\frac{3}{6}$ of 18 $\qquad$ $\frac{2}{3}$ of 27 = $\frac{6}{9}$ of 27

8. $\frac{3}{4}$ of 24 = $\frac{6}{8}$ of 24 $\qquad$ $\frac{1}{5}$ of 20 = $\frac{2}{10}$ of 20

9. $\frac{1}{6}$ of 24 = $\frac{2}{12}$ of 24 $\qquad$ $\frac{1}{4}$ of 32 = $\frac{2}{8}$ of 32

10. $\frac{1}{3}$ of 18 = $\frac{2}{6}$ of 18 $\qquad$ $\frac{2}{5}$ of 20 = $\frac{4}{10}$ of 20

Now you have learned:

When you multiply both terms of a fraction by the same number, you change it to a new fraction that is equal to the first one. Both fractions have the same value.

Changing Fractions to a Common Denominator

In some examples the denominators of fractions are different. Study each problem below and its example.

1. Betty used $\frac{1}{2}$ of a yard of blue cloth to make an apron and $\frac{1}{4}$ of a yard of pink cloth to trim it. What fraction of a yard of cloth did she use altogether?

You must add to find the answer, but you can only add like fractions. You need to change $\frac{1}{2}$ and $\frac{1}{4}$ to like fractions. This means that you change them to a *common denominator.* You cannot change $\frac{1}{4}$ to halves because $\frac{1}{4}$ of a yard is smaller than $\frac{1}{2}$ of a yard. You can change $\frac{1}{2}$ to $\frac{2}{4}$ because $\frac{1}{2}$ of a yard is equal to $\frac{2}{4}$ of a yard. The common denominator is 4.

By what number do you multiply both terms of $\frac{1}{2}$ to change it to $\frac{2}{4}$?

$$\begin{array}{rl} \frac{1}{2} \text{ yd.} & = \frac{2}{4} \text{ yd.} \\ +\frac{1}{4} \text{ yd.} & = +\frac{1}{4} \text{ yd.} \\ \hline & \frac{3}{4} \text{ yd.} \end{array}$$

Since $\frac{2}{4}$ and $\frac{1}{4}$ have a common denominator, what kind of fractions are they? How do you add like fractions?

What is the answer to the question the problem asks?

2. Jack and Peter bought 8 apples. Jack ate $\frac{1}{4}$ of them and Peter ate $\frac{1}{8}$ of them. What fraction of all the apples did the boys eat?

At the right is the example for the problem.

$$\begin{array}{rl} \frac{1}{4} & = \frac{2}{8} \\ +\frac{1}{8} & = \frac{1}{8} \\ \hline & \frac{3}{8} \end{array}$$

Can you change $\frac{1}{8}$ to fourths? Can you change $\frac{1}{4}$ to eighths? What is the common denominator?

How do you change $\frac{1}{4}$ to $\frac{2}{8}$? How do you add like fractions? $\frac{2}{8} + \frac{1}{8} = ?$

What fraction of all 8 apples did the boys eat?

Now you have learned:

- Before you can add unlike fractions you must change them to a *common denominator.* Then they are like fractions.

Adding Unlike Fractions

One denominator in each of the examples below is the common denominator. Change to like fractions and add.

1.

$\frac{3}{4}$	$\frac{3}{8}$	$\frac{1}{3}$	$\frac{5}{6}$	$\frac{2}{9}$	$\frac{3}{8}$	$\frac{1}{9}$	$\frac{1}{4}$	$\frac{2}{9}$	$\frac{3}{5}$	$\frac{1}{5}$	$\frac{4}{9}$
$\frac{1}{8}$	$\frac{1}{2}$	$\frac{5}{9}$	$\frac{1}{12}$	$\frac{2}{3}$	$\frac{5}{16}$	$\frac{2}{3}$	$\frac{5}{8}$	$\frac{1}{3}$	$\frac{3}{10}$	$\frac{1}{10}$	$\frac{1}{3}$

2. Mary sold $\frac{1}{3}$ of a dozen cookies and Jane sold $\frac{1}{6}$ of a dozen. What fraction of a dozen did the girls sell?

At the right is the example for the problem.

$$\begin{aligned} \tfrac{1}{3} \text{ doz.} &= \tfrac{2}{6} \text{ doz.} \\ +\tfrac{1}{6} \text{ doz.} &= \tfrac{1}{6} \text{ doz.} \\ \tfrac{3}{6} \text{ doz.} &= \tfrac{1}{2} \text{ doz.} \end{aligned}$$

Why is 6 the common denominator for $\frac{1}{3}$ and $\frac{1}{6}$?

By what number do you multiply both terms of $\frac{1}{3}$ to change it to $\frac{2}{6}$?

By what number do you divide both terms of $\frac{3}{6}$ to reduce it to $\frac{1}{2}$?

How do you add like fractions?

What is the answer for the problem?

Find the sums for the examples below. Be sure that each answer is in the lowest terms.

3.

$\frac{1}{2}$	$\frac{1}{5}$	$\frac{1}{2}$	$\frac{1}{12}$	$\frac{1}{4}$	$\frac{5}{12}$	$\frac{1}{6}$	$\frac{1}{10}$	$\frac{1}{3}$	$\frac{2}{3}$
$\frac{1}{6}$	$\frac{3}{10}$	$\frac{3}{10}$	$\frac{1}{6}$	$\frac{1}{12}$	$\frac{1}{3}$	$\frac{7}{12}$	$\frac{1}{2}$	$\frac{4}{15}$	$\frac{1}{12}$

4.

$\frac{2}{3}$	$\frac{1}{8}$	$\frac{4}{9}$	$\frac{7}{12}$	$\frac{7}{15}$	$\frac{1}{16}$	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{2}{3}$
$\frac{1}{6}$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{1}{15}$	$\frac{5}{12}$	$\frac{2}{15}$	$\frac{2}{15}$

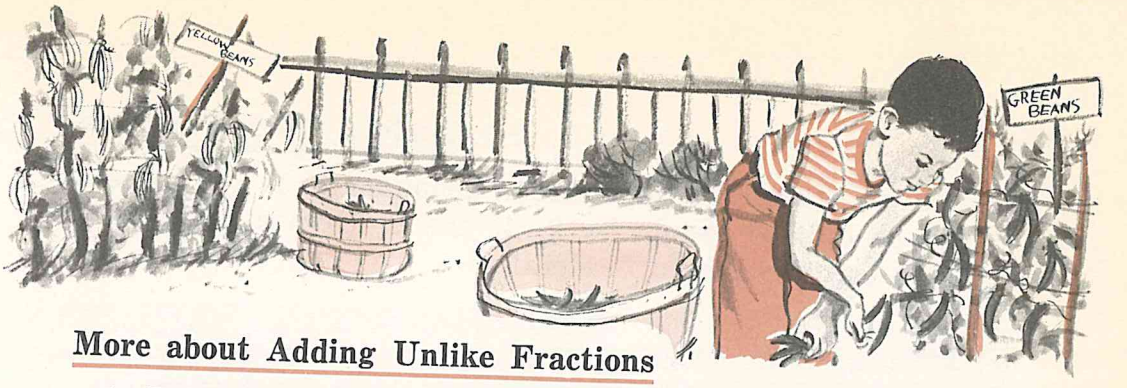
Change the fractions below to equal fractions. Try to do the work mentally and write the answers only.

5. $\frac{1}{2} = \frac{?}{4}$ $\quad \frac{1}{4} = \frac{?}{16}$ $\quad \frac{3}{8} = \frac{?}{16}$ $\quad \frac{1}{2} = \frac{?}{8}$ $\quad \frac{3}{4} = \frac{?}{8}$ $\quad \frac{5}{8} = \frac{?}{16}$

6. $\frac{1}{2} = \frac{?}{16}$ $\quad \frac{3}{4} = \frac{?}{16}$ $\quad \frac{7}{8} = \frac{?}{16}$ $\quad \frac{1}{4} = \frac{?}{8}$ $\quad \frac{1}{8} = \frac{?}{16}$ $\quad \frac{1}{3} = \frac{?}{6}$

7. $\frac{2}{3} = \frac{?}{6}$ $\quad \frac{1}{5} = \frac{?}{10}$ $\quad \frac{3}{5} = \frac{?}{10}$ $\quad \frac{2}{3} = \frac{?}{18}$ $\quad \frac{1}{6} = \frac{?}{12}$ $\quad \frac{1}{3} = \frac{?}{9}$

8. $\frac{2}{3} = \frac{?}{9}$ $\quad \frac{1}{4} = \frac{?}{12}$ $\quad \frac{3}{4} = \frac{?}{12}$ $\quad \frac{1}{3} = \frac{?}{12}$ $\quad \frac{2}{3} = \frac{?}{12}$ $\quad \frac{1}{5} = \frac{?}{20}$



More about Adding Unlike Fractions

1. Bob picked $\frac{1}{2}$ of a bushel of green beans and $\frac{3}{4}$ of a bushel of yellow beans. How many bushels did he have?

Study the example for the problem:

$$\begin{array}{r} \frac{1}{2} = \frac{2}{4} \\ +\frac{3}{4} = \frac{3}{4} \\ \hline \frac{5}{4} = 1\frac{1}{4} \end{array}$$

Why was $\frac{1}{2}$ changed to $\frac{2}{4}$?

What kind of a fraction is $\frac{5}{4}$? How do you change $\frac{5}{4}$ to the mixed number $1\frac{1}{4}$?

2. In this example why was $\frac{1}{2}$ changed to $\frac{3}{6}$? $\frac{8}{6}$ to $1\frac{2}{6}$? $\frac{2}{6}$ to $\frac{1}{3}$?

$$\begin{array}{r} \frac{5}{6} = \frac{5}{6} \\ +\frac{1}{2} = \frac{3}{6} \\ \hline \frac{8}{6} = 1\frac{2}{6} \text{ or } 1\frac{1}{3} \end{array}$$

Add, and change each sum to a mixed number. Each answer should be in lowest terms:

3.

$\frac{1}{3}$	$\frac{3}{4}$	$\frac{2}{5}$	$\frac{1}{2}$	$\frac{2}{3}$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{3}{4}$	$\frac{2}{3}$	$\frac{3}{4}$
$\frac{5}{6}$	$\frac{5}{8}$	$\frac{7}{10}$	$\frac{7}{8}$	$\frac{4}{9}$	$\frac{5}{8}$	$\frac{7}{9}$	$\frac{7}{8}$	$\frac{5}{9}$	$\frac{3}{8}$

4.

$\frac{1}{2}$	$\frac{2}{3}$	$\frac{9}{10}$	$\frac{3}{4}$	$\frac{7}{10}$	$\frac{5}{6}$	$\frac{4}{5}$	$\frac{11}{12}$	$\frac{1}{2}$	$\frac{1}{3}$
$\frac{9}{10}$	$\frac{5}{6}$	$\frac{3}{5}$	$\frac{7}{12}$	$\frac{1}{2}$	$\frac{11}{12}$	$\frac{7}{10}$	$\frac{1}{4}$	$\frac{5}{8}$	$\frac{11}{12}$

5.

$\frac{1}{3}$	$\frac{2}{5}$	$\frac{3}{5}$	$\frac{1}{2}$	$\frac{4}{5}$	$\frac{2}{3}$	$\frac{5}{16}$	$\frac{8}{15}$	$\frac{1}{2}$	$\frac{7}{15}$
$\frac{11}{15}$	$\frac{14}{15}$	$\frac{11}{15}$	$\frac{11}{12}$	$\frac{9}{10}$	$\frac{5}{12}$	$\frac{3}{4}$	$\frac{4}{5}$	$\frac{7}{12}$	$\frac{2}{3}$

6.

$\frac{1}{3}$	$\frac{11}{12}$	$\frac{3}{4}$	$\frac{3}{5}$	$\frac{13}{15}$	$\frac{2}{3}$	$\frac{4}{5}$	$\frac{2}{3}$	$\frac{2}{3}$	$\frac{15}{16}$
$\frac{13}{15}$	$\frac{5}{6}$	$\frac{11}{12}$	$\frac{9}{10}$	$\frac{2}{3}$	$\frac{5}{9}$	$\frac{3}{10}$	$\frac{8}{15}$	$\frac{7}{12}$	$\frac{1}{4}$

7.

$\frac{2}{3}$	$\frac{5}{8}$	$\frac{5}{12}$	$\frac{8}{15}$	$\frac{13}{15}$	$\frac{3}{4}$	$\frac{5}{6}$	$\frac{2}{3}$	$\frac{3}{4}$	$\frac{9}{16}$
$\frac{8}{9}$	$\frac{7}{16}$	$\frac{5}{6}$	$\frac{4}{5}$	$\frac{4}{5}$	$\frac{5}{12}$	$\frac{7}{12}$	$\frac{11}{15}$	$\frac{7}{16}$	$\frac{5}{8}$

Now you have learned:

- When the sum of fractions is an improper fraction, you must reduce it to a whole number or a mixed number.

Adding Three Fractions

1. In example A the common denominator is 8 because 8 can be divided evenly by 2, 4, and 8. Do you see that $\frac{1}{2}$ and $\frac{1}{4}$ can be changed to eighths?

A
$$\begin{array}{r} \frac{1}{2} = \frac{4}{8} \\ \frac{1}{4} = \frac{2}{8} \\ +\frac{1}{8} = \frac{1}{8} \\ \hline \frac{7}{8} \end{array}$$

B
$$\begin{array}{r} \frac{7}{10} = \frac{7}{10} \\ \frac{1}{10} = \frac{1}{10} \\ +\frac{1}{5} = \frac{2}{10} \\ \hline \frac{10}{10} = 1 \end{array}$$

C
$$\begin{array}{r} \frac{1}{2} = \frac{6}{12} \\ \frac{5}{12} = \frac{5}{12} \\ +\frac{2}{3} = \frac{8}{12} \\ \hline \frac{19}{12} = 1\frac{7}{12} \end{array}$$

2. Why is 10 the common denominator in example B? Why is 12 the common denominator in example C?

3. Do you have like fractions in each example after changing the fractions to a common denominator? What was done to find the sums?

4. What kind of fraction is the sum in example B?

5. What kind of fraction is the sum of the fractions in example C? How was it changed to a mixed number?

Copy and add. Reduce your answers to lowest terms.

6.

$\frac{1}{2}$	$\frac{1}{8}$	$\frac{1}{12}$	$\frac{1}{5}$	$\frac{1}{3}$	$\frac{1}{12}$	$\frac{1}{6}$	$\frac{3}{8}$	$\frac{2}{3}$	$\frac{3}{8}$
$\frac{1}{3}$	$\frac{1}{16}$	$\frac{1}{6}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{4}$
$\frac{1}{12}$	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{1}{10}$	$\frac{1}{12}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{9}{16}$	$\frac{1}{6}$	$\frac{5}{8}$

7.

$\frac{1}{12}$	$\frac{1}{2}$	$\frac{2}{3}$	$\frac{1}{12}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{3}{4}$	$\frac{1}{5}$	$\frac{1}{3}$
$\frac{5}{6}$	$\frac{2}{5}$	$\frac{5}{6}$	$\frac{1}{3}$	$\frac{1}{5}$	$\frac{3}{8}$	$\frac{5}{16}$	$\frac{1}{3}$	$\frac{3}{10}$	$\frac{5}{9}$
$\frac{2}{3}$	$\frac{3}{10}$	$\frac{1}{2}$	$\frac{5}{6}$	$\frac{3}{10}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{5}{12}$	$\frac{2}{5}$	$\frac{2}{3}$

8.

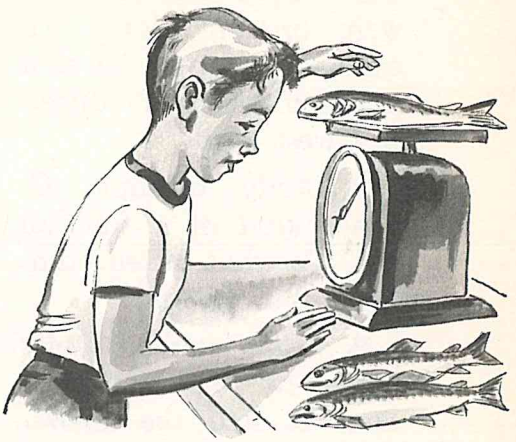
$\frac{1}{2}$	$\frac{2}{5}$	$\frac{2}{3}$	$\frac{5}{6}$	$\frac{1}{6}$	$\frac{7}{10}$	$\frac{3}{4}$	$\frac{2}{3}$	$\frac{7}{10}$	$\frac{3}{8}$
$\frac{7}{8}$	$\frac{3}{10}$	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{2}{3}$	$\frac{3}{5}$	$\frac{3}{16}$	$\frac{3}{4}$	$\frac{1}{5}$	$\frac{1}{4}$
$\frac{3}{16}$	$\frac{3}{5}$	$\frac{5}{12}$	$\frac{1}{12}$	$\frac{7}{12}$	$\frac{1}{2}$	$\frac{1}{8}$	$\frac{5}{12}$	$\frac{1}{5}$	$\frac{3}{4}$

9.

$\frac{1}{2}$	$\frac{1}{2}$	$\frac{2}{3}$	$\frac{1}{2}$	$\frac{3}{5}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{2}{3}$	$\frac{5}{6}$	$\frac{7}{12}$
$\frac{1}{4}$	$\frac{1}{4}$	$\frac{5}{6}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{5}{6}$	$\frac{1}{3}$	$\frac{3}{4}$
$\frac{7}{8}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{8}$	$\frac{7}{10}$	$\frac{1}{12}$	$\frac{7}{8}$	$\frac{1}{3}$	$\frac{1}{6}$	$\frac{1}{3}$

Using Fractions to Solve Problems

1. Jane bought 3 pieces of ribbon. One was $\frac{3}{4}$ of a yard long, another $\frac{7}{8}$ of a yard, and another $\frac{1}{2}$ of a yard. How many yards of ribbon did she buy?



2. James caught 3 small fish. One weighed $\frac{5}{8}$ of a pound, another weighed $\frac{7}{8}$ of a pound, and the third weighed $\frac{3}{4}$ of a pound. What was the total weight of the three fish?

3. Howard walked $\frac{3}{4}$ of a mile to school, $\frac{3}{4}$ of a mile back home, and $\frac{1}{2}$ of a mile to the library. How far did he walk in all?

4. Laura bought $\frac{1}{2}$ of a dozen molasses cookies, $\frac{1}{2}$ of a dozen peanut butter cookies, and $\frac{3}{4}$ of a dozen sugar cookies. How many dozen cookies did she buy in all?

5. On Friday Alfred worked at the store for $\frac{1}{2}$ of an hour before school and $\frac{3}{4}$ of an hour after school. How many hours did he work in all on Friday?

6. How many are $\frac{1}{4}$ doz., $\frac{1}{2}$ doz., and $\frac{3}{4}$ doz.?

7. How many ounces equal $\frac{1}{2}$ lb., $\frac{1}{4}$ lb., and $\frac{1}{8}$ lb.?

8. Change each of these fractions to twelfths: $\frac{3}{4}$, $\frac{1}{2}$, $\frac{5}{6}$, $\frac{2}{3}$.

9. Change each of the following improper fractions to a mixed number: $\frac{5}{4}$, $\frac{8}{6}$, $\frac{12}{8}$, $\frac{9}{4}$.

10. What does the denominator of the fraction $\frac{5}{12}$ tell you? What does the numerator tell you?

11. What is the common denominator of thirds, halves, and sixths?

12. Which of these fractions equal 1? $\frac{3}{2}$, $\frac{4}{4}$, $\frac{5}{6}$, $\frac{8}{8}$, $\frac{12}{12}$.

13. Tell which of these are improper fractions: $\frac{7}{8}$, $\frac{9}{6}$, $\frac{5}{3}$, $\frac{1}{2}$, $\frac{7}{4}$, $\frac{9}{16}$, $\frac{11}{6}$, $\frac{9}{7}$, $\frac{12}{12}$, $\frac{21}{18}$, $\frac{3}{2}$, $\frac{14}{13}$, $\frac{5}{5}$.

Adding Mixed Numbers and Fractions

1. Study example A and example B. First the fractions were changed to a common denominator. Then the numerators were added and the ones were brought down. In example B the fraction in the answer was reduced to lowest terms.

2. Study example C. What kind of a fraction is $\frac{5}{4}$? To what mixed number was it changed?

3. Study example D. Be ready to tell what was done to find the answer for this example.

4. How does example D differ from example C?

A

$$2\tfrac{1}{2} = 2\tfrac{2}{4}$$
$$+\tfrac{1}{4} = \tfrac{1}{4}$$
$$2\tfrac{3}{4}$$

B

$$8\tfrac{1}{6} = 8\tfrac{1}{6}$$
$$+\tfrac{1}{3} = \tfrac{2}{6}$$
$$8\tfrac{3}{6} = 8\tfrac{1}{2}$$

C

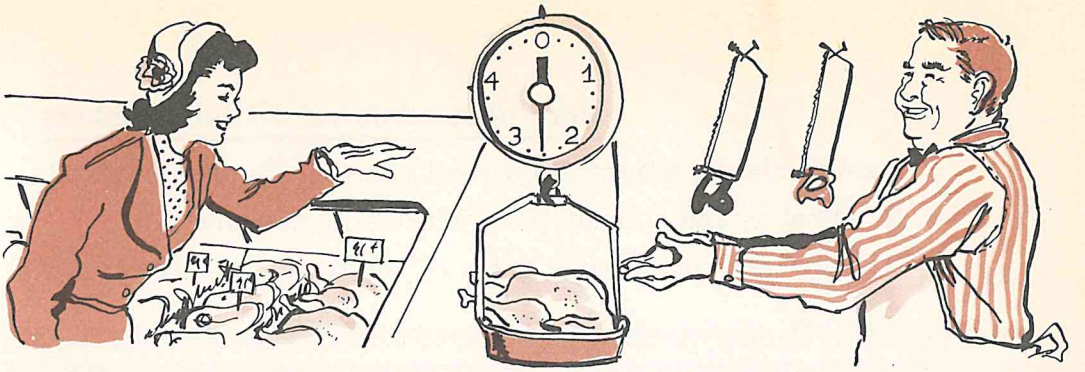
$$5\tfrac{3}{4} = 5\tfrac{3}{4}$$
$$+\tfrac{1}{2} = \tfrac{2}{4}$$
$$5\tfrac{5}{4} = 5 + 1\tfrac{1}{4} = 6\tfrac{1}{4}$$

D

$$9\tfrac{2}{3} = 9\tfrac{4}{6}$$
$$+\tfrac{5}{6} = \tfrac{5}{6}$$
$$9\tfrac{9}{6} = 9 + 1\tfrac{3}{6} = 10\tfrac{3}{6} = 10\tfrac{1}{2}$$

Copy the examples below and add. Reduce the fraction in each answer to lowest terms when necessary.

5.	$8\frac{1}{4}$	$5\frac{3}{8}$	$7\frac{1}{2}$	$\frac{1}{9}$	$6\frac{1}{5}$	$\frac{1}{2}$	$3\frac{1}{2}$	$4\frac{5}{8}$
	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{8}$	$3\frac{2}{3}$	$\frac{1}{10}$	$4\frac{3}{8}$	$\frac{1}{4}$	$\frac{1}{4}$
6.	$2\frac{1}{5}$	$4\frac{1}{6}$	$7\frac{1}{10}$	$\frac{1}{2}$	$8\frac{1}{2}$	$\frac{3}{10}$	$7\frac{1}{3}$	$\frac{1}{4}$
	$\frac{3}{10}$	$\frac{1}{12}$	$\frac{2}{5}$	$4\frac{1}{6}$	$\frac{1}{10}$	$8\frac{1}{2}$	$\frac{1}{6}$	$9\frac{1}{12}$
7.	$\frac{3}{4}$	$7\frac{5}{6}$	$1\frac{2}{5}$	$\frac{1}{4}$	$9\frac{1}{2}$	$9\frac{3}{4}$	$\frac{5}{6}$	$7\frac{1}{2}$
	$4\frac{5}{8}$	$\frac{1}{3}$	$\frac{7}{10}$	$6\frac{7}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	$3\frac{7}{12}$	$\frac{7}{12}$
8.	$\frac{9}{10}$	$2\frac{5}{6}$	$5\frac{7}{10}$	$\frac{11}{12}$	$6\frac{3}{4}$	$\frac{4}{5}$	$5\frac{1}{2}$	$\frac{3}{4}$
	$8\frac{3}{5}$	$\frac{5}{12}$	$\frac{1}{2}$	$4\frac{1}{4}$	$\frac{7}{12}$	$8\frac{7}{10}$	$\frac{5}{6}$	$2\frac{9}{16}$
9.	$\frac{1}{4}$	$9\frac{1}{5}$	$5\frac{9}{10}$	$\frac{2}{5}$	$8\frac{1}{3}$	$9\frac{3}{16}$	$\frac{1}{2}$	$\frac{3}{4}$
	$3\frac{1}{4}$	$\frac{1}{10}$	$\frac{2}{5}$	$\frac{2}{5}$	$\frac{1}{9}$	$\frac{5}{16}$	$\frac{5}{6}$	$5\frac{1}{3}$
	$\frac{1}{8}$	$\frac{1}{5}$	$\frac{1}{5}$	$9\frac{7}{10}$	$\frac{1}{3}$	$\frac{3}{8}$	$2\frac{1}{3}$	$\frac{5}{12}$



Adding Mixed Numbers

1. Joan's mother bought one frying chicken that weighed $2\frac{1}{2}$ pounds and another that weighed $3\frac{1}{4}$ pounds. What was the total weight of both chickens?

Find the answer by adding as in example A below. Change one fraction to an equal fraction with the common denominator. Add the fractions. Then add the whole numbers.

A	B
$2\frac{1}{2} = 2\frac{2}{4}$	$4\frac{1}{3} = 4\frac{4}{12}$
$+3\frac{1}{4} = 3\frac{1}{4}$	$+7\frac{5}{12} = 7\frac{5}{12}$
$5\frac{3}{4}$	$11\frac{9}{12} = 11\frac{3}{4}$

2. Study example B above. How does it differ from A?

Find the answers for these addition examples and problems:

3.

$4\frac{2}{3}$	$7\frac{1}{4}$	$6\frac{1}{9}$	$3\frac{1}{8}$	$9\frac{2}{3}$	$6\frac{1}{10}$	$4\frac{1}{2}$	$6\frac{2}{9}$
$9\frac{1}{6}$	$5\frac{1}{8}$	$8\frac{1}{3}$	$4\frac{3}{4}$	$2\frac{1}{9}$	$7\frac{3}{5}$	$2\frac{1}{12}$	$9\frac{1}{3}$

4.

$8\frac{1}{3}$	$5\frac{1}{2}$	$6\frac{1}{10}$	$7\frac{1}{4}$	$3\frac{1}{2}$	$5\frac{7}{12}$	$4\frac{2}{15}$	$5\frac{1}{3}$
$6\frac{1}{6}$	$9\frac{1}{6}$	$7\frac{1}{2}$	$4\frac{1}{12}$	$2\frac{3}{10}$	$3\frac{1}{6}$	$7\frac{1}{5}$	$4\frac{5}{12}$

5. Herbert's father needed $8\frac{1}{6}$ yards of metal stripping for the sides of a long work table and $1\frac{1}{3}$ yards to finish one end. How many yards of stripping did he need in all?

6. Mary's uncle put his eggs into cartons holding 1 dozen each. He filled $4\frac{1}{3}$ cartons one week and $7\frac{5}{12}$ cartons the next week. How many cartons did he fill in both weeks?

More about Adding Mixed Numbers

Answer the questions about examples A, B, and C below.

1. What is the sum of the fractions in example A?

2. How do you change $\frac{5}{4}$ to $1\frac{1}{4}$? Why is the answer $5\frac{1}{4}$?

A

$$1\tfrac{1}{2} = 1\tfrac{2}{4}$$
$$+3\tfrac{3}{4} = 3\tfrac{3}{4}$$
$$4\tfrac{5}{4} = 4 + 1\tfrac{1}{4} = 5\tfrac{1}{4}$$

B

$$4\tfrac{1}{2} = 4\tfrac{3}{6}$$
$$+3\tfrac{5}{6} = 3\tfrac{5}{6}$$
$$7\tfrac{8}{6} = 7 + 1\tfrac{2}{6} = 8\tfrac{2}{6} = 8\tfrac{1}{3}$$

3. What is the new step in example B?

4. How is example C different from example A? From example B?

C

$$1\tfrac{1}{6} = 1\tfrac{1}{6}$$
$$1\tfrac{1}{2} = 1\tfrac{3}{6}$$
$$+1\tfrac{2}{3} = 1\tfrac{4}{6}$$
$$3\tfrac{8}{6} = 3 + 1\tfrac{2}{6} = 4\tfrac{2}{6} = 4\tfrac{1}{3}$$

Copy and find the sums:

5.	$5\frac{3}{8}$	$8\frac{2}{3}$	$7\frac{1}{3}$	$3\frac{3}{5}$	$8\frac{8}{9}$	$6\frac{1}{4}$	$4\frac{3}{4}$	$1\frac{5}{9}$
	$2\frac{3}{4}$	$4\frac{4}{9}$	$6\frac{5}{6}$	$5\frac{7}{10}$	$9\frac{2}{3}$	$9\frac{7}{8}$	$6\frac{5}{8}$	$3\frac{2}{3}$
6.	$7\frac{2}{3}$	$3\frac{1}{2}$	$4\frac{3}{4}$	$5\frac{7}{10}$	$1\frac{2}{3}$	$9\frac{9}{10}$	$2\frac{1}{2}$	$6\frac{1}{4}$
	$4\frac{5}{6}$	$2\frac{7}{10}$	$2\frac{7}{12}$	$8\frac{4}{5}$	$6\frac{7}{12}$	$8\frac{3}{5}$	$5\frac{9}{10}$	$4\frac{11}{12}$
7.	$2\frac{2}{3}$	$2\frac{7}{8}$	$2\frac{1}{2}$	$5\frac{1}{4}$	$3\frac{7}{12}$	$7\frac{1}{5}$	$4\frac{3}{10}$	$4\frac{1}{4}$
	$1\frac{1}{4}$	$6\frac{1}{4}$	$1\frac{3}{5}$	$3\frac{5}{12}$	$3\frac{3}{4}$	$8\frac{4}{15}$	$2\frac{1}{2}$	$2\frac{1}{3}$
	$4\frac{5}{12}$	$3\frac{1}{2}$	$3\frac{1}{10}$	$6\frac{2}{3}$	$1\frac{1}{6}$	$3\frac{2}{3}$	$2\frac{4}{5}$	$1\frac{11}{12}$
8.	$2\frac{1}{2}$	$4\frac{11}{16}$	$8\frac{1}{2}$	$6\frac{1}{2}$	$2\frac{1}{4}$	$5\frac{7}{12}$	$4\frac{7}{8}$	$6\frac{5}{12}$
	$6\frac{7}{8}$	$9\frac{3}{4}$	$1\frac{7}{12}$	$3\frac{3}{4}$	$4\frac{15}{16}$	$4\frac{1}{2}$	$7\frac{9}{16}$	$8\frac{2}{3}$
9.	$3\frac{3}{4}$	$2\frac{5}{8}$	$5\frac{5}{6}$	$9\frac{1}{3}$	$7\frac{5}{6}$	$3\frac{3}{4}$	$5\frac{1}{3}$	$3\frac{8}{15}$
	$3\frac{7}{8}$	$4\frac{1}{2}$	$3\frac{5}{12}$	$6\frac{1}{6}$	$2\frac{1}{2}$	$9\frac{5}{12}$	$4\frac{11}{12}$	$1\frac{2}{3}$
10.	$2\frac{1}{2}$	$5\frac{5}{12}$	$2\frac{2}{3}$	$5\frac{1}{2}$	$3\frac{1}{6}$	$\frac{5}{6}$	$4\frac{1}{2}$	$7\frac{5}{9}$
	$2\frac{3}{4}$	$5\frac{1}{4}$	$3\frac{5}{12}$	$2\frac{3}{4}$	$8\frac{2}{3}$	$6\frac{2}{3}$	$6\frac{2}{3}$	$3\frac{2}{3}$
	$3\frac{3}{8}$	$9\frac{7}{12}$	$8\frac{1}{12}$	$\frac{5}{8}$	$9\frac{1}{3}$	$5\frac{5}{12}$	$4\frac{5}{6}$	$1\frac{4}{9}$

Writing Answers Only

Find the answers for the problems below without writing the examples. Write the answers only.

1. What is the cost of 3 dozen eggs at $.60 a dozen?

2. How much change should you get if you use a 5 dollar bill to pay for 2 shirts priced at $2.10 each?

3. How much change should you get from $2.00 if you bought a book for $1.50 and a notebook cover for $.25?

4. Horace paid 45¢ for 3 pounds of fresh peaches. What was the price per pound?

5. Louise studied her arithmetic lesson for $\frac{1}{2}$ of an hour at school and for $\frac{1}{4}$ of an hour at home. What fraction of an hour did she study in all?

6. If the schoolroom is 30 feet wide and 32 feet long, what is the area in square feet?

7. What is the perimeter of the same schoolroom?

8. Virgil's father bought 3 white shirts for $9.60. What was the cost of each shirt?

9. Joan is 50 inches tall, Mary is 55 inches tall, and Sarah is 60 inches tall. What is the average height of the three girls?

10. Mr. Harper gets 20 miles to a gallon of gas with his new car. How many gallons will he need to drive 120 miles?

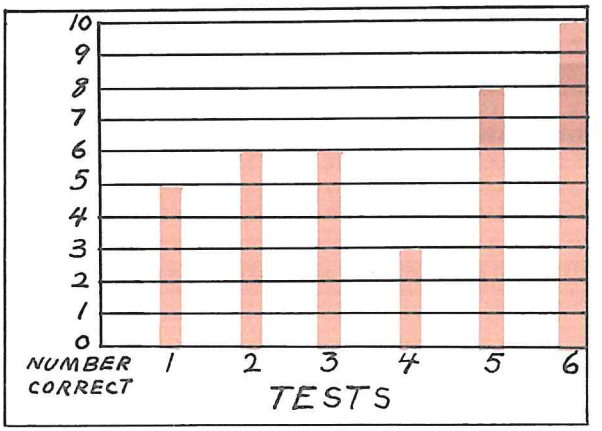
11. Rachel's father came home on a train due to arrive at 4:45 p.m. It arrived at 5:30 p.m. How many minutes late was the train?

12. Dave has $13.00. He needs $15 to buy a suit. If he can save 50¢ a week, how many weeks will it take him to save enough to buy the suit?

13. James is reading a book that has XIV chapters in it. He has finished Chapter IX. How many more chapters does he have to read?

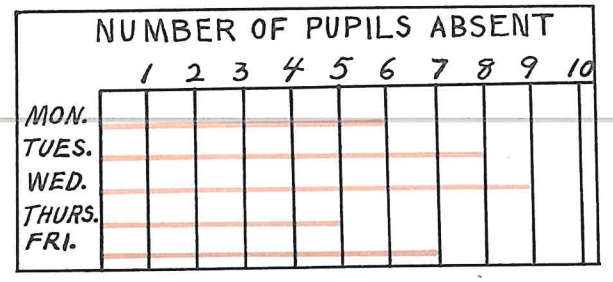
Using Bar Graphs

A picture like the one just below is called a *bar graph.* Graphs are used to give information in a way that makes it easy to understand. This graph shows Tom's score on each of six arithmetic tests which he has taken.



Each line running from left to right stands for 1 example. The bar extending upward from 1 at the bottom ends at line 5. Tom had 5 examples correct on test 1.

1. How many examples were wrong on test 1?
2. How many examples were correct on test 3?
3. How many examples did Tom have correct on test 5?
4. On which test did Tom have his lowest score? His highest?
5. On which test did Tom make a perfect score?
6. Do you think that Tom is improving in arithmetic? Why?



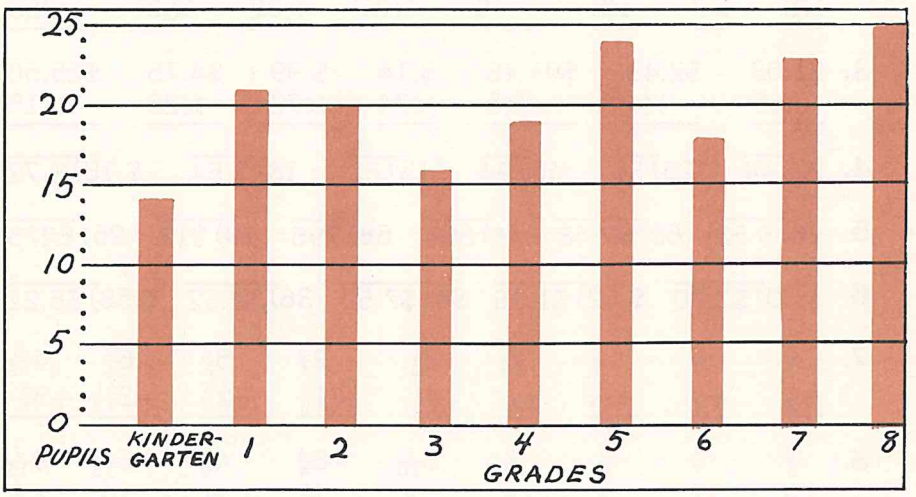
This bar graph shows the number of pupils absent from the Clinton School by days during one week.

The up and down lines represent numbers of pupils. The bars across the graph show the number of pupils absent. The bar for Monday stops at 6, which means that 6 pupils were absent that day.

7. How many pupils were absent on each of the other days?
8. What was the total number of absences for the week?
9. What was the average number of absences per day?

Stamp Day

The bar graph below shows the number of children in each grade who bought savings stamps on Stamp Day. The numbers at the left stand for pupils. Each line running across the graph marks off a space which stands for 5 pupils. You can estimate that 21 first graders bought stamps because the bar for grade 1 stops about $\frac{1}{5}$ of the way between 20 and 25. Use the graph to answer the questions below.



1. In which grade did the most children buy stamps? How many in this grade bought stamps?

2. Which grade has the shortest bar? How many children in that grade bought stamps?

3. In which grades did 20 or more children buy stamps?

4. How many children in the sixth grade bought stamps?

5. How many fewer stamps were bought by children in grade 6 than by children in grade 8?

6. In which grade did 19 children buy stamps?

7. How many children in all the grades bought stamps?

8. What was the average number of children per grade who bought stamps?

Review and Practice

Find the answers. Watch the signs.

1.

2151	6375	2418	4100	\$49.51	\$90.89
4322	2143	5314	2070	−23.60	−59.99
6951	5732	3702	5308		
3873	6851	6849	1046	\$53.08	\$70.00
+3682	+4968	+4516	+6000	−32.69	−39.45

2.

71	85	575	2415	1385	47	280	264
×8	×7	×8	×6	×25	×32	×45	×328

3.

\$1.03	\$2.48	\$91.18	\$.14	\$.99	\$4.75	\$25.50
×9	×4	×5	×74	×72	×25	×15

4. $22\overline{)44}$ $25\overline{)50}$ $46\overline{)94}$ $13\overline{)52}$ $18\overline{)\$.54}$ $\$.18\overline{)\$.72}$

5. $26\overline{)\$.52}$ $62\overline{)\$2.48}$ $74\overline{)888}$ $58\overline{)796}$ $19\overline{)212}$ $25\overline{)5275}$

6. $\$.70\overline{)\$2.80}$ $\$.62\overline{)\$1.86}$ $94\overline{)\$7.52}$ $36\overline{)\$2.52}$ $\$.58\overline{)\$5.22}$

7.

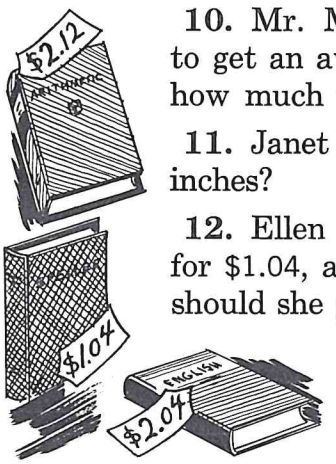
$\frac{1}{3}$	$\frac{3}{4}$	$\frac{1}{3}$	$\frac{3}{10}$	$2\frac{1}{6}$	$2\frac{3}{4}$	$5\frac{2}{3}$	$6\frac{3}{4}$	$4\frac{5}{12}$
$+\frac{1}{3}$	$+\frac{1}{4}$	$+\frac{4}{15}$	$+\frac{1}{5}$	$+\frac{1}{3}$	$+1\frac{3}{8}$	$+2\frac{5}{6}$	$+2\frac{11}{12}$	$+3\frac{5}{6}$

8.

$\frac{2}{3}$	$\frac{4}{7}$	$\frac{5}{8}$	$\frac{5}{9}$	$3\frac{7}{10}$	$8\frac{3}{4}$	$4\frac{5}{6}$	$6\frac{15}{16}$	$9\frac{7}{12}$
$-\frac{1}{3}$	$-\frac{2}{7}$	$-\frac{1}{8}$	$-\frac{4}{9}$	$-\frac{3}{10}$	$-1\frac{1}{4}$	$-2\frac{1}{6}$	$-1\frac{3}{16}$	$-4\frac{5}{12}$

Solve these problems:

9. Mr. Johnson bought $1\frac{1}{2}$ tons of nut-size coal and $3\frac{3}{4}$ tons of stove-size coal. How many tons of coal did he buy altogether?



10. Mr. Meyer had a 6-acre field of potatoes. He hoped to get an average of 150 bushels per acre. At \$2.50 a bushel, how much money did he hope to get for his potatoes?

11. Janet is 55 inches tall. What is her height in feet and inches?

12. Ellen bought an arithmetic book for \$2.12, a speller for \$1.04, and an English book for \$2.04. How much change should she get from \$10?

To Help You Remember

The numbers after the questions are page numbers that tell you where to turn for help if you need it.

▶ *To think and talk about:*

1. By what number would you multiply the terms of $\frac{1}{2}$ to make it equal $\frac{2}{4}$? (198, 199)

2. What is the least common denominator for $\frac{1}{3}$ and $\frac{1}{6}$? Explain how you would change the $\frac{1}{3}$ to a fraction having the common denominator for the two fractions. (198, 199)

3. Explain why you cannot add $\frac{1}{2}$ and $\frac{1}{4}$ before changing to a common denominator. (199)

4. Prove that $\frac{1}{2}$ of a yard is equal to $\frac{2}{4}$ of a yard. In what way is $\frac{1}{2}$ of a yard different from $\frac{2}{4}$ of a yard? (197)

5. If you add two fractions and get a sum of $\frac{5}{4}$, what else must you do? (201)

6. If you add mixed numbers and get a sum of $8\frac{5}{4}$, what else must you do? What will the final answer be? (204, 205)

7. Why are graphs useful? (208, 209)

▶ *To think about and write:*

Find the answers:

1. $\begin{array}{r} \frac{1}{7} \\ +\frac{2}{7} \end{array}$ (129)

2. $\begin{array}{r} \frac{3}{8} \\ +\frac{3}{8} \end{array}$ (131)

3. $\begin{array}{r} \frac{3}{4} \\ +\frac{1}{12} \end{array}$ (200)

4. $\begin{array}{r} \frac{5}{6} \\ +\frac{11}{12} \end{array}$ (201)

5. $\begin{array}{r} \frac{1}{3} \\ +5\frac{1}{6} \end{array}$ (204)

6. $\begin{array}{r} 7\frac{1}{2} \\ +4\frac{3}{8} \end{array}$ (205)

7. $\begin{array}{r} 8\frac{5}{6} \\ +3\frac{2}{3} \end{array}$ (206)

8. $\begin{array}{r} 4\frac{3}{10} \\ +3\frac{4}{5} \end{array}$ (206)

9. $12\overline{)370}$ (178)

10. $26\overline{)572}$ (179)

11. $15\overline{)555}$ (181)

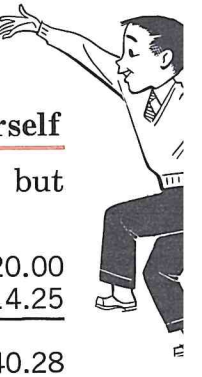
12. $47\overline{)2358}$ (186)

13. $70\overline{)5295}$ (188)

14. $13\overline{)1183}$ (187)

15. Make a bar graph showing the temperature at 8:00 a.m. for each of the seven days of one week. (208)

16. Add 3657, 14963, 207, 26, and 25002. (68, 155)



Testing Yourself

Find the answers. Watch the signs. Work quickly, but take time to get your answers right.

1.

5007	2432	9507	4480	$50.92	$20.00
9243	6895	4003	5250	−22.84	−14.25
4068	7021	2618	6931		
7509	5649	4205	2684	$65.95	$40.28
+3087	+8255	+8352	+5432	−30.97	−27.39

2.

$\frac{1}{5}$	$\frac{5}{6}$	$\frac{2}{3}$	$\frac{5}{12}$	$3\frac{1}{2}$	$4\frac{5}{8}$	$3\frac{2}{3}$	$6\frac{5}{12}$	$4\frac{3}{8}$
$+\frac{2}{5}$	$+\frac{1}{6}$	$+\frac{1}{12}$	$+\frac{1}{4}$	$+\frac{3}{10}$	$+1\frac{3}{8}$	$+4\frac{7}{12}$	$+3\frac{3}{4}$	$+7\frac{13}{16}$

3.

$\frac{4}{7}$	$\frac{7}{8}$	$\frac{8}{9}$	$\frac{3}{4}$	$4\frac{8}{9}$	$6\frac{3}{8}$	$5\frac{5}{8}$	$8\frac{11}{12}$	$9\frac{7}{16}$
$-\frac{3}{7}$	$-\frac{5}{8}$	$-\frac{2}{9}$	$-\frac{1}{4}$	$-\frac{5}{9}$	$-2\frac{1}{8}$	$-1\frac{1}{8}$	$-4\frac{5}{12}$	$-2\frac{3}{16}$

4.

65	354	$5.64	42	254	1850	$25.59	275
×8	×2	×5	×75	×37	×25	×45	×322

5. $30\overline{)90}$ $33\overline{)99}$ $16\overline{)75}$ $16\overline{)99}$ $45\overline{)545}$ $18\overline{)118}$ $32\overline{)9984}$

6. $16\overline{)\$.64}$ $13\overline{)\$4.55}$ $32\overline{)\$40.48}$ $\$.21\overline{)\$.84}$ $\$.15\overline{)\$35.25}$

Solve these problems:

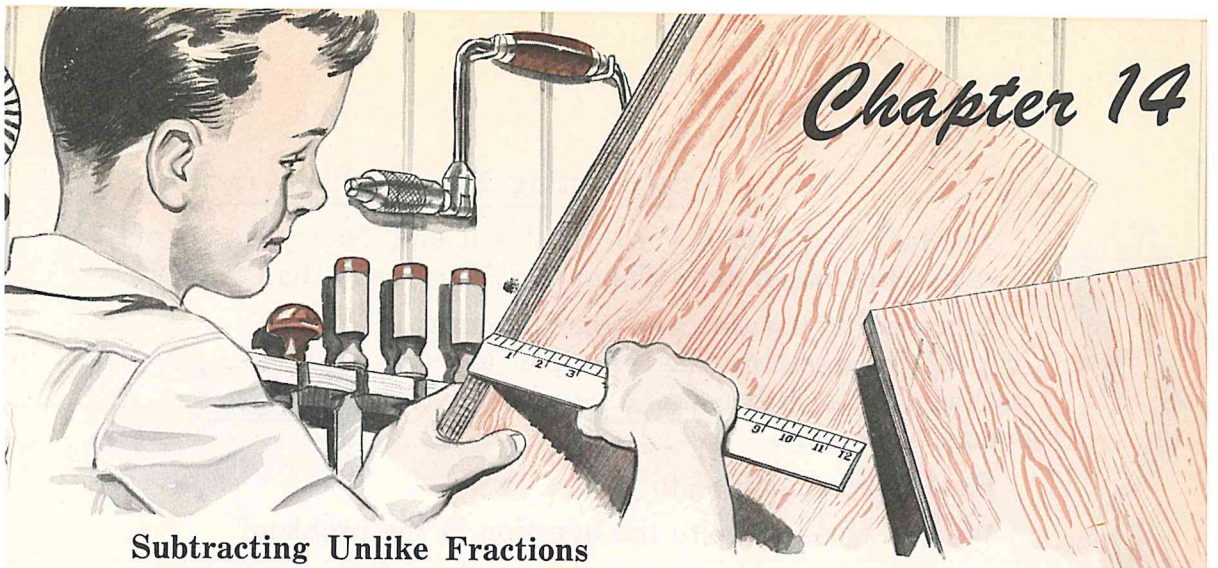
7. How much cheaper is a quart of berries for $.45 than 2 pints of berries at $.23 a pint?

8. Julie bought $\frac{2}{3}$ of a yard of cloth and used a piece 22 inches long. How many inches of cloth did she have left?

9. During September Betty saved these amounts from her allowance: First week, $.35; Second week, $.40; Third week, $.25; Fourth week, $.30. If she saves an equal amount each month for 4 months, how much money will she have?

10. On December 1 Bill had $7.70. During the month he received $2.19 and paid out $3.25. What was his balance at the end of December?

11. A grocer paid $6.00 for a case of 12 dozen eggs. He sold them at $.73 a dozen. How much more did he get for each dozen eggs than he had paid?



Chapter 14

Subtracting Unlike Fractions

1. Dick finds that one piece of plywood is $\frac{3}{4}$ of an inch thick and the other is $\frac{3}{8}$ of an inch thick. What is the difference in the thickness of the two pieces?

You can see that $\frac{3}{4}$ and $\frac{3}{8}$ are unlike fractions. You cannot subtract until the two fractions have a common denominator.

$$\begin{array}{r} \frac{3}{4} \\ -\frac{3}{8} \\ \hline ? \end{array} \qquad \begin{array}{r} \frac{3}{4} = \frac{6}{8} \\ -\frac{3}{8} = \frac{3}{8} \\ \hline \frac{3}{8} \end{array}$$

$$\frac{2 \times 3}{2 \times 4} = \frac{6}{8} \quad \text{so} \quad \frac{3}{4} = \frac{6}{8}$$

Why is 8 the common denominator for $\frac{3}{4}$ and $\frac{3}{8}$?

Why do we multiply both terms of $\frac{3}{4}$ by 2 to change it to $\frac{6}{8}$?

What kind of fractions are $\frac{6}{8}$ and $\frac{3}{8}$? How do you subtract like fractions? (See page 145.)

What is the answer for the question the problem asks?

Change to like fractions and subtract:

2.

$\frac{3}{4}$	$\frac{2}{3}$	$\frac{7}{8}$	$\frac{7}{9}$	$\frac{5}{8}$	$\frac{5}{9}$	$\frac{2}{5}$	$\frac{1}{6}$	$\frac{1}{2}$	$\frac{1}{3}$
$\frac{1}{2}$	$\frac{5}{9}$	$\frac{3}{4}$	$\frac{2}{3}$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{3}{10}$	$\frac{1}{12}$	$\frac{1}{4}$	$\frac{1}{6}$

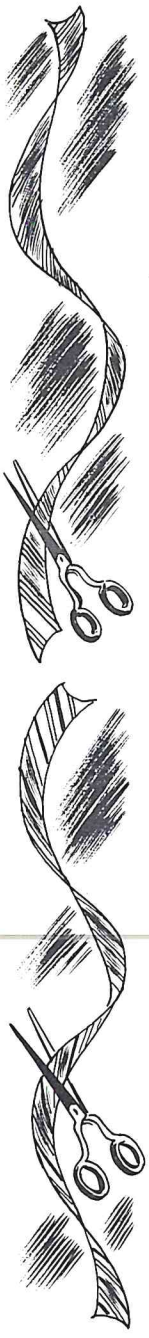
3.

$\frac{3}{8}$	$\frac{3}{5}$	$\frac{2}{3}$	$\frac{7}{8}$	$\frac{2}{3}$	$\frac{9}{10}$	$\frac{7}{12}$	$\frac{3}{4}$	$\frac{1}{4}$	$\frac{3}{4}$
$\frac{5}{16}$	$\frac{3}{10}$	$\frac{4}{9}$	$\frac{7}{16}$	$\frac{1}{9}$	$\frac{3}{5}$	$\frac{1}{6}$	$\frac{3}{8}$	$\frac{1}{8}$	$\frac{1}{8}$

Now you have learned:

- To subtract unlike fractions you must first make them like fractions by changing them to a common denominator.

Subtracting More Unlike Fractions



1. Mary had $\frac{2}{3}$ of a yard of ribbon and Nancy had $\frac{1}{6}$ of a yard. How much more ribbon did Mary have than Nancy?

You see that 6 is the common denominator of the fractions in the example for this problem. This is because 6 can be divided evenly by 3 and 6.

$$\begin{array}{r} \frac{2}{3} = \frac{4}{6} \\ -\frac{1}{6} = \frac{1}{6} \\ \hline \frac{3}{6} = \frac{1}{2} \end{array}$$

How do you change $\frac{3}{6}$ to $\frac{1}{2}$?

What is the answer to the question in the problem?

2. Subtract and reduce each answer to lowest terms.

$\frac{3}{5}$	$\frac{5}{6}$	$\frac{7}{10}$	$\frac{5}{12}$	$\frac{9}{10}$	$\frac{5}{6}$	$\frac{7}{12}$	$\frac{5}{12}$	$\frac{7}{12}$	$\frac{3}{4}$
$\frac{1}{10}$	$\frac{7}{12}$	$\frac{1}{5}$	$\frac{1}{6}$	$\frac{2}{5}$	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{12}$

3. In A and B the minuends are mixed numbers.

Why is 4 the common denominator in A?

Why is 10 the common denominator in B?

A	B
$9\frac{1}{2} = 9\frac{2}{4}$	$8\frac{3}{5} = 8\frac{6}{10}$
$-\frac{1}{4} = \frac{1}{4}$	$-\frac{1}{10} = \frac{1}{10}$
$9\frac{1}{4}$	$8\frac{5}{10} = 8\frac{1}{2}$

To find the answers, subtract the fractions and bring down the ones. In the answer for example B, $\frac{5}{10}$ was changed to $\frac{1}{2}$.

Copy and subtract. In row 4 reduce the fraction in each answer to lowest terms.

4. $6\frac{2}{3}$	$4\frac{5}{8}$	$7\frac{2}{5}$	$3\frac{3}{4}$	$6\frac{7}{8}$	$8\frac{5}{6}$	$3\frac{1}{2}$	$4\frac{2}{3}$
$\frac{5}{9}$	$\frac{1}{4}$	$\frac{3}{10}$	$\frac{3}{8}$	$\frac{3}{4}$	$\frac{5}{12}$	$\frac{1}{8}$	$\frac{2}{9}$
5. $5\frac{1}{2}$	$4\frac{1}{4}$	$7\frac{3}{4}$	$9\frac{1}{2}$	$6\frac{2}{3}$	$3\frac{4}{5}$	$8\frac{5}{6}$	$6\frac{1}{3}$
$\frac{1}{10}$	$\frac{1}{12}$	$\frac{5}{12}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{3}{15}$	$\frac{1}{12}$	$\frac{1}{12}$
6. $9\frac{7}{8}$	$4\frac{7}{10}$	$8\frac{4}{9}$	$5\frac{7}{10}$	$6\frac{1}{2}$	$8\frac{1}{5}$	$4\frac{3}{4}$	$5\frac{1}{3}$
$\frac{1}{16}$	$\frac{3}{5}$	$\frac{1}{3}$	$\frac{2}{5}$	$\frac{3}{16}$	$\frac{1}{10}$	$\frac{5}{8}$	$\frac{1}{9}$
7. $3\frac{1}{3}$	$7\frac{7}{8}$	$5\frac{2}{3}$	$8\frac{4}{5}$	$6\frac{7}{12}$	$4\frac{4}{5}$	$9\frac{5}{7}$	$2\frac{7}{8}$
$\frac{1}{6}$	$\frac{1}{2}$	$\frac{1}{9}$	$\frac{3}{10}$	$\frac{1}{2}$	$\frac{8}{15}$	$\frac{1}{14}$	$\frac{5}{16}$

Subtracting Mixed Numbers

1. In the examples at the right below both the minuend and the subtrahend are mixed numbers.

Study the examples to see how they are worked.

What was done to get the answer in example A?

What was done to get the answer in example B? What additional step is there in example B?

Copy and subtract. Be sure that each answer is in lowest terms.

A

$$\begin{array}{rcl} 10\frac{5}{8} & = & 10\frac{5}{8} \\ -5\frac{1}{2} & = & 5\frac{4}{8} \\ \hline & & 5\frac{1}{8} \end{array}$$

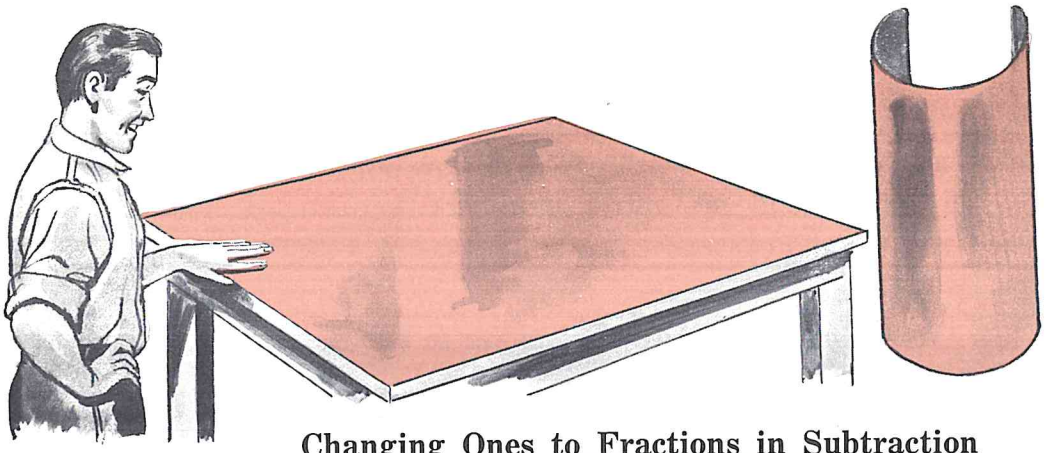
B

$$\begin{array}{rcl} 16\frac{3}{4} & = & 16\frac{9}{12} \\ -9\frac{1}{12} & = & 9\frac{1}{12} \\ \hline & & 7\frac{8}{12} = 7\frac{2}{3} \end{array}$$

2.	$8\frac{3}{8}$	$6\frac{2}{5}$	$8\frac{7}{8}$	$9\frac{3}{4}$	$7\frac{1}{6}$	$9\frac{8}{9}$	$4\frac{1}{2}$	$3\frac{2}{3}$
	$2\frac{5}{16}$	$6\frac{1}{10}$	$7\frac{1}{4}$	$4\frac{1}{2}$	$5\frac{1}{12}$	$8\frac{2}{3}$	$2\frac{1}{12}$	$1\frac{4}{9}$
3.	$7\frac{4}{5}$	$9\frac{9}{10}$	$6\frac{5}{6}$	$9\frac{5}{12}$	$8\frac{3}{5}$	$9\frac{5}{6}$	$3\frac{2}{5}$	$8\frac{4}{5}$
	$4\frac{3}{10}$	$8\frac{2}{5}$	$1\frac{1}{2}$	$5\frac{1}{4}$	$8\frac{1}{10}$	$7\frac{1}{3}$	$1\frac{1}{15}$	$5\frac{7}{15}$
4.	$3\frac{1}{2}$	$9\frac{1}{2}$	$9\frac{5}{8}$	$9\frac{1}{4}$	$8\frac{1}{3}$	$7\frac{7}{8}$	$9\frac{3}{5}$	$5\frac{5}{6}$
	$1\frac{1}{8}$	$2\frac{1}{6}$	$1\frac{1}{4}$	$5\frac{1}{8}$	$2\frac{1}{6}$	$5\frac{1}{2}$	$3\frac{3}{10}$	$2\frac{5}{12}$
5.	$9\frac{3}{4}$	$8\frac{5}{12}$	$9\frac{3}{4}$	$8\frac{3}{8}$	$8\frac{5}{6}$	$9\frac{1}{2}$	$6\frac{7}{9}$	$3\frac{7}{8}$
	$7\frac{5}{8}$	$7\frac{1}{3}$	$5\frac{5}{12}$	$5\frac{1}{4}$	$4\frac{2}{3}$	$3\frac{5}{12}$	$4\frac{1}{3}$	$1\frac{9}{16}$
6.	$5\frac{1}{4}$	$7\frac{3}{4}$	$9\frac{7}{12}$	$9\frac{7}{8}$	$9\frac{3}{4}$	$9\frac{5}{8}$	$8\frac{4}{5}$	$9\frac{3}{5}$
	$4\frac{1}{16}$	$7\frac{5}{12}$	$8\frac{1}{2}$	$4\frac{3}{4}$	$7\frac{1}{8}$	$7\frac{1}{2}$	$4\frac{1}{10}$	$5\frac{4}{15}$
7.	$5\frac{1}{2}$	$9\frac{1}{4}$	$9\frac{2}{3}$	$8\frac{3}{8}$	$6\frac{3}{4}$	$8\frac{2}{3}$	$7\frac{5}{6}$	$9\frac{5}{8}$
	$4\frac{1}{16}$	$1\frac{1}{12}$	$9\frac{2}{9}$	$7\frac{3}{16}$	$5\frac{1}{12}$	$6\frac{1}{9}$	$2\frac{7}{12}$	$7\frac{9}{16}$
8.	$6\frac{5}{9}$	$9\frac{3}{4}$	$9\frac{1}{5}$	$4\frac{5}{12}$	$8\frac{7}{8}$	$9\frac{5}{6}$	$4\frac{8}{9}$	$6\frac{2}{3}$
	$3\frac{1}{3}$	$1\frac{3}{8}$	$6\frac{1}{10}$	$3\frac{1}{6}$	$3\frac{5}{16}$	$8\frac{1}{12}$	$1\frac{1}{3}$	$2\frac{1}{6}$

Solve this problem:

9. Sue has $2\frac{2}{3}$ yards of pink ribbon and $1\frac{1}{6}$ yards of blue. How many more yards of pink ribbon than blue has she?



Changing Ones to Fractions in Subtraction

1. Mary's father had $1\frac{1}{2}$ square yards of linoleum. He used $\frac{3}{4}$ of a square yard to cover the top of a small table. What fraction of a square yard of linoleum did he have left?

This is the example for the problem.

$$\begin{array}{r} 1\frac{1}{2} = 1\frac{2}{4} = \frac{6}{4} \\ -\frac{3}{4} = \frac{3}{4} = \frac{3}{4} \\ \hline ? \qquad\quad \frac{3}{4} \end{array}$$

You cannot subtract unlike fractions so $\frac{1}{2}$ was changed to $\frac{2}{4}$. But $\frac{2}{4}$ is less than $\frac{3}{4}$, so the 1 one in the minuend was changed to $\frac{4}{4}$ and added to $\frac{2}{4}$. $\frac{6}{4} - \frac{3}{4} = ?$

Copy the examples in rows 2 and 3 below and subtract.

2.

$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{1}{9}$	$1\frac{1}{8}$	$1\frac{2}{3}$	$1\frac{1}{6}$	$1\frac{1}{2}$	$1\frac{2}{3}$
$\frac{3}{8}$	$\frac{7}{8}$	$\frac{2}{3}$	$\frac{3}{4}$	$\frac{8}{9}$	$\frac{1}{3}$	$\frac{5}{8}$	$\frac{5}{6}$

3.

$1\frac{5}{12}$	$1\frac{1}{16}$	$1\frac{1}{10}$	$1\frac{3}{10}$	$1\frac{3}{14}$	$1\frac{1}{15}$	$1\frac{1}{3}$	$1\frac{1}{4}$
$\frac{5}{6}$	$\frac{7}{8}$	$\frac{4}{5}$	$\frac{2}{5}$	$\frac{4}{7}$	$\frac{1}{5}$	$\frac{4}{9}$	$\frac{1}{2}$

4. Bob's uncle had $1\frac{1}{6}$ acres of land. He sold $\frac{2}{3}$ of an acre. How much land did he have left?

In working the example for the problem, why was $\frac{2}{3}$ changed to $\frac{4}{6}$?

$$\begin{array}{r} 1\frac{1}{6} = 1\frac{1}{6} = \frac{7}{6} \\ -\frac{2}{3} = \frac{4}{6} = \frac{4}{6} \\ \hline ? \qquad\quad \frac{3}{6} = \frac{1}{2} \end{array}$$

Why was 1 changed to $\frac{6}{6}$?

Why was $\frac{3}{6}$ reduced to $\frac{1}{2}$?

Copy and subtract. Reduce each answer to lowest terms.

5.

$1\frac{7}{12}$	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{1}{12}$	$1\frac{3}{10}$	$1\frac{1}{18}$	$1\frac{1}{2}$	$1\frac{1}{3}$
$\frac{5}{6}$	$\frac{5}{12}$	$\frac{5}{6}$	$\frac{1}{3}$	$\frac{4}{5}$	$\frac{1}{6}$	$\frac{7}{10}$	$\frac{5}{6}$

More about Changing Ones to Fractions

1. Dan had a board $4\frac{1}{4}$ feet long. He cut off a piece $\frac{7}{8}$ of a foot long. How many feet long was the piece that was left?

$$4\tfrac{1}{4} = 4\tfrac{2}{8} = 3\tfrac{10}{8}$$
$$\underline{-\tfrac{7}{8}} = \underline{\tfrac{7}{8}} = \underline{\tfrac{7}{8}}$$
$$3\tfrac{3}{8}$$

Why was $\frac{1}{4}$ changed to $\frac{2}{8}$?

What kind of fractions are $\frac{2}{8}$ and $\frac{7}{8}$?

Can you subtract these like fractions?

Why was $4\frac{2}{8}$ changed to $3\frac{10}{8}$?

Why were the 3 ones brought down?

2. Study this example:

$$4\tfrac{3}{10} = 4\tfrac{3}{10} = 3\tfrac{13}{10}$$
$$\underline{-\tfrac{4}{5}} = \underline{\tfrac{8}{10}} = \underline{\tfrac{8}{10}}$$
$$3\tfrac{5}{10} = 3\tfrac{1}{2}$$

How do you change $\frac{5}{10}$ to $\frac{1}{2}$?

Why is $\frac{1}{2}$ in lowest terms?

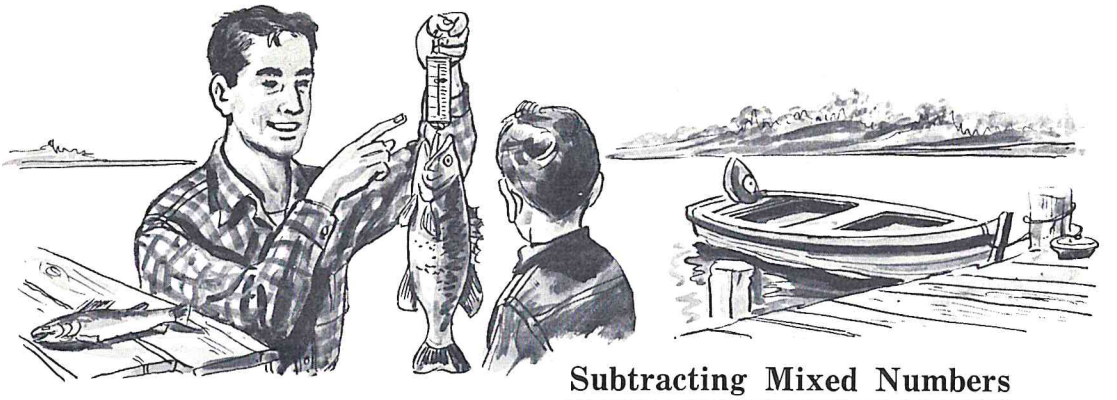
Copy the examples below and subtract. The examples in row 3 are like those in the first example above. The examples in row 4 are like the second example above. Reduce fractions in the other examples when necessary.

3.	$5\frac{1}{12}$	$7\frac{3}{10}$	$9\frac{1}{4}$	$3\frac{1}{9}$	$6\frac{1}{2}$	$8\frac{1}{8}$	$4\frac{1}{2}$	$7\frac{3}{8}$
	$\underline{\frac{1}{6}}$	$\underline{\frac{2}{5}}$	$\underline{\frac{7}{8}}$	$\underline{\frac{1}{3}}$	$\underline{\frac{3}{4}}$	$\underline{\frac{3}{16}}$	$\underline{\frac{5}{8}}$	$\underline{\frac{3}{4}}$
4.	$3\frac{2}{5}$	$8\frac{5}{12}$	$6\frac{1}{10}$	$5\frac{1}{12}$	$9\frac{1}{6}$	$4\frac{1}{2}$	$3\frac{1}{2}$	$2\frac{1}{4}$
	$\underline{\frac{9}{10}}$	$\underline{\frac{3}{4}}$	$\underline{\frac{1}{2}}$	$\underline{\frac{1}{4}}$	$\underline{\frac{2}{3}}$	$\underline{\frac{5}{6}}$	$\underline{\frac{7}{10}}$	$\underline{\frac{7}{12}}$
5.	$2\frac{2}{3}$	$7\frac{1}{15}$	$4\frac{3}{8}$	$6\frac{7}{16}$	$2\frac{1}{6}$	$7\frac{1}{6}$	$9\frac{3}{4}$	$8\frac{1}{9}$
	$\underline{\frac{8}{9}}$	$\underline{\frac{2}{5}}$	$\underline{\frac{1}{2}}$	$\underline{\frac{3}{4}}$	$\underline{\frac{5}{12}}$	$\underline{\frac{1}{3}}$	$\underline{\frac{7}{8}}$	$\underline{\frac{2}{3}}$
6.	$3\frac{1}{4}$	$5\frac{1}{6}$	$9\frac{1}{8}$	$7\frac{1}{8}$	$4\frac{1}{8}$	$2\frac{1}{4}$	$6\frac{3}{4}$	$3\frac{1}{12}$
	$\underline{\frac{1}{2}}$	$\underline{\frac{1}{2}}$	$\underline{\frac{1}{4}}$	$\underline{\frac{1}{2}}$	$\underline{\frac{3}{4}}$	$\underline{\frac{3}{8}}$	$\underline{\frac{11}{12}}$	$\underline{\frac{5}{6}}$

Solve these problems:

7. Ray cut a piece of rope 11 feet long into two pieces for his sisters to use as jump ropes. One piece was $6\frac{1}{2}$ feet long. How long was the other piece?

8. We stay at school 3 hours each morning. We use $\frac{1}{2}$ of an hour for recess. How much of the morning is left for work?



Subtracting Mixed Numbers

1. Dick's father caught a fish that weighed $8\frac{1}{4}$ pounds. Dick caught one that weighed $3\frac{1}{2}$ pounds. How much heavier was the larger fish than the smaller fish?

To find the answer, subtract as shown.

$$\begin{aligned} 8\tfrac{1}{4} &= 8\tfrac{1}{4} = 7\tfrac{5}{4} \\ -3\tfrac{1}{2} &= 3\tfrac{2}{4} = 3\tfrac{2}{4} \\ & \qquad 4\tfrac{3}{4} \end{aligned}$$

There are three steps in working the example. They are as follows:

- $\frac{1}{4}$ and $\frac{1}{2}$ are unlike fractions. They must be like fractions before you can subtract. What is the common denominator? The common denominator for $\frac{1}{4}$ and $\frac{1}{2}$ is 4, because 4 can be divided evenly by both 2 and 4. $\frac{1}{2} = \frac{2}{4}$.
- But $\frac{1}{4}$ is less than $\frac{2}{4}$. You must change 1 one to $\frac{4}{4}$. Remember 7 ones are left. $\frac{4}{4} + \frac{1}{4} = \frac{5}{4}$.
- Now you can subtract. $\frac{5}{4} - \frac{2}{4} = \frac{3}{4}$. $7 - 3 = 4$.

What is the answer for the question the problem asks?

Study the example at the right.

2. How does this example differ from the example above?

3. Explain how to find the answer for this example.

$$\begin{aligned} 7\tfrac{1}{6} &= 7\tfrac{1}{6} = 6\tfrac{7}{6} \\ -1\tfrac{2}{3} &= 1\tfrac{4}{6} = 1\tfrac{4}{6} \\ & \qquad 5\tfrac{3}{6} = 5\tfrac{1}{2} \end{aligned}$$

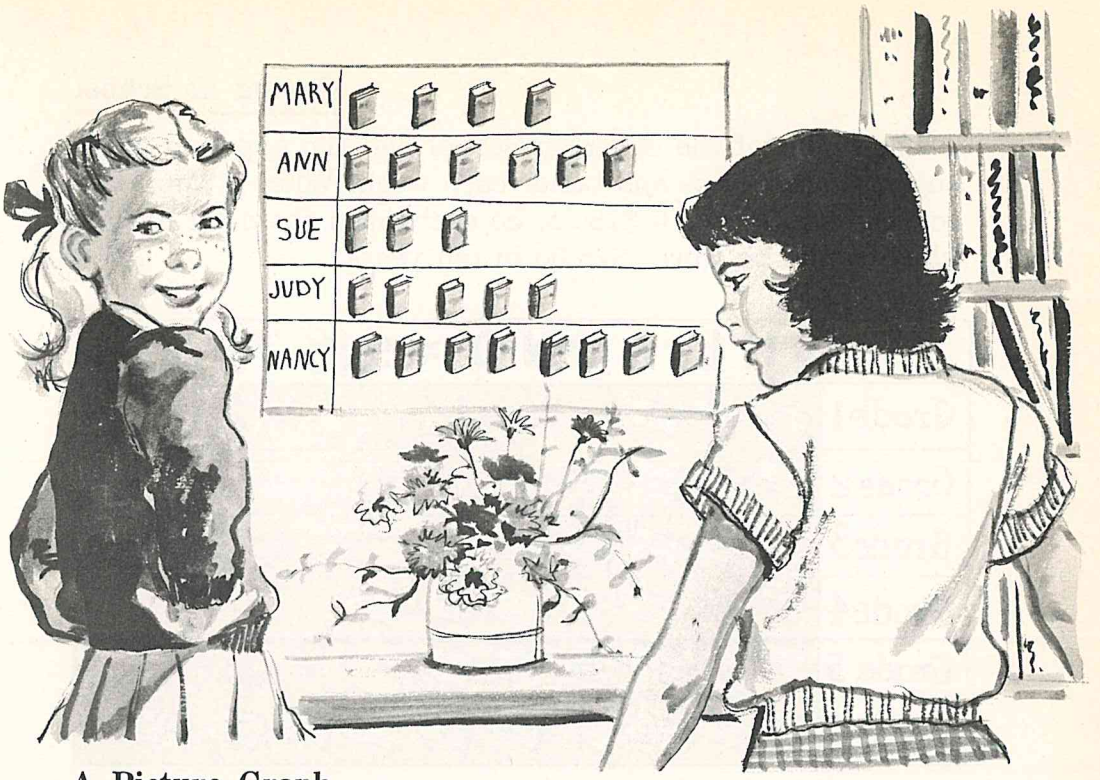
Copy the examples below and subtract.

4.

$3\frac{1}{6}$	$5\frac{1}{9}$	$7\frac{2}{3}$	$9\frac{1}{2}$	$9\frac{4}{9}$	$9\frac{1}{8}$	$6\frac{5}{12}$	$9\frac{1}{15}$
$1\frac{1}{3}$	$4\frac{1}{3}$	$2\frac{5}{6}$	$3\frac{3}{4}$	$8\frac{2}{3}$	$6\frac{3}{4}$	$1\frac{2}{3}$	$5\frac{2}{3}$

5.

$6\frac{1}{6}$	$5\frac{1}{12}$	$9\frac{1}{10}$	$4\frac{5}{12}$	$8\frac{7}{12}$	$7\frac{4}{15}$	$4\frac{1}{6}$	$7\frac{1}{2}$
$1\frac{5}{12}$	$1\frac{1}{3}$	$4\frac{3}{5}$	$3\frac{3}{4}$	$2\frac{2}{3}$	$5\frac{3}{5}$	$3\frac{11}{12}$	$5\frac{7}{8}$



A Picture Graph

Miss Johnson, the librarian, made a picture to show the number of books read by some of the girls who had organized a book club. The picture is called a *picture graph*. Each book in the picture stands for a book read. The graph shows that Nancy has read 8 books.

1. How many books were read by Ann? By Sue? By Judy?

2. How many more books were read by Nancy than by Sue?

3. In what two ways could you compare the number of books read by Sue and the number of books read by Ann?

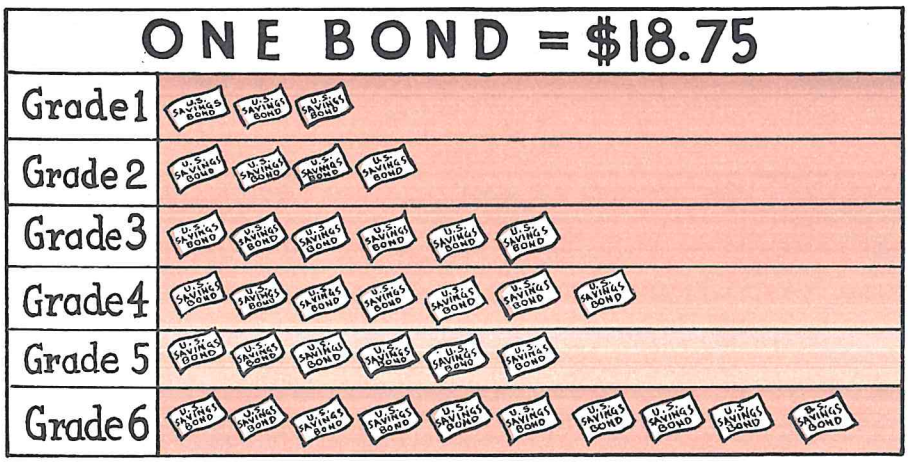
4. How many more books must Sue read to have as many books on the graph as Judy? To have read as many as Mary?

5. How many more books were read by Nancy than by Mary?

6. How many times as many books were read by Nancy as by Mary?

Saving at School

The pupils of the Jefferson School had the opportunity to buy savings stamps and bonds each week. When a pupil had bought stamps worth $18.75, he exchanged them for a bond which would be worth $25.00 in ten years.



The picture graph above shows the number of bonds bought by the pupils from September to January.

Use the picture graph to answer these questions:

1. Which grade bought 7 bonds?

2. Which grade bought the most bonds?

3. At $18.75 each what did the bonds bought by the fifth-grade pupils cost?

4. What is the difference between the number of bonds bought by the sixth-grade pupils and the second-grade pupils?

5. How much greater was the value of the bonds bought by the pupils in the sixth grade than the value of those bought by the pupils in the third grade?

6. How many bonds were bought by the whole school?

7. What was the value of all the bonds bought by the pupils of Jefferson School?

Dividing Hundreds in Four-Place Numbers

1. Mr. Fox shipped 6000 pounds of milk to the dairy in 30 days. What was the average amount shipped per day?

You solve this problem by dividing.

Change 6 thousands to 60 hundreds.
Divide and *multiply*.
Bring down the 0 in tens' place. There are no tens to divide, so write 0 in tens' place in the quotient.

$$\begin{array}{r} 200 \\ 30\overline{)6000} \\ 60 \\ \hline 00 \end{array}$$

Bring down the 0 in ones' place. There are no ones to divide, so write 0 in ones' place in the quotient.

What is the answer for the question the problem asks?

Find the answers for the examples below.

2. $40\overline{)8000}$ $20\overline{)6000}$ $78\overline{)7800}$ $32\overline{)6400}$ $33\overline{)9900}$

3. $10\overline{)1000}$ $12\overline{)4800}$ $11\overline{)7700}$ $18\overline{)3600}$ $16\overline{)6400}$

There is a remainder in the answer for each example in rows 4 and 5.

4. $25\overline{)5008}$ $38\overline{)7635}$ $46\overline{)9210}$ $24\overline{)7212}$ $29\overline{)5827}$

5. $13\overline{)3905}$ $12\overline{)2410}$ $15\overline{)9008}$ $14\overline{)5612}$ $18\overline{)7215}$

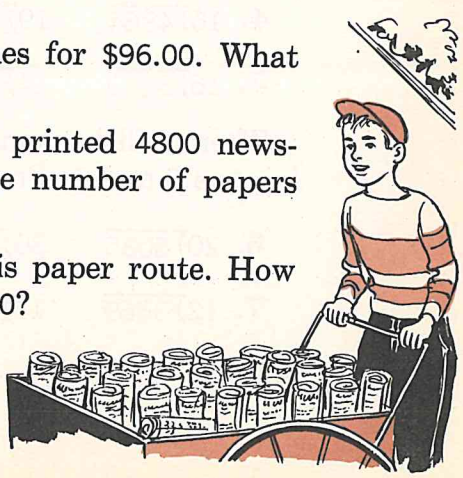
Solve these problems:

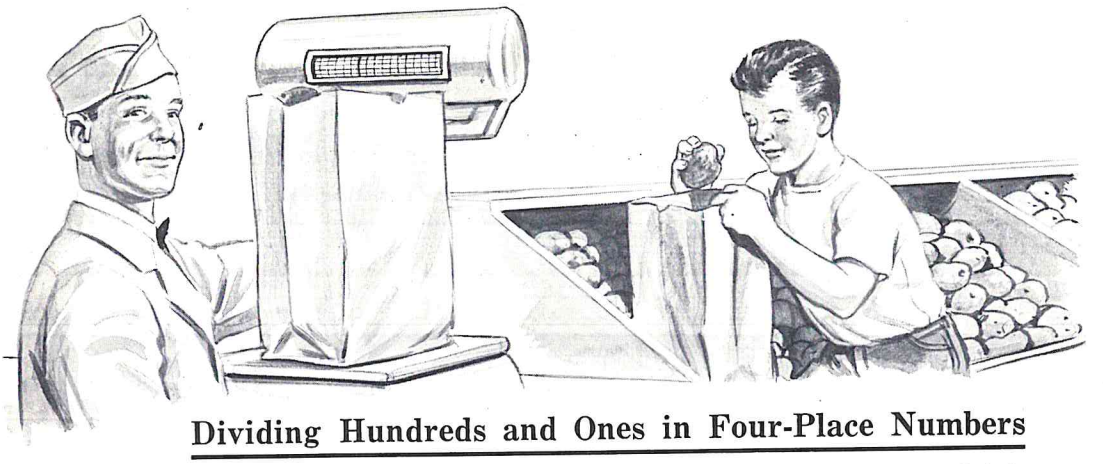
6. The children in Washington School bought \$50.00 worth of 25¢ savings stamps in the first half year. How many 25¢ stamps had these children bought?

7. A grocer sold 32 bushels of peaches for \$96.00. What was the price per bushel?

8. Edwin read that a printing press printed 4800 newspapers per hour. What was the average number of papers printed per minute?

9. A newsboy earns \$.90 a day on his paper route. How many days will it take him to earn \$19.80?





Dividing Hundreds and Ones in Four-Place Numbers

1. A grocer put 1530 pounds of potatoes into bags which held 15 pounds each. How many bags did he fill?

Divide. Do it this way:

Change thousands to hundreds; *divide; multiply.*

Bring down tens. There are not enough tens to divide. Write 0 in tens' place in the quotient.

Bring down ones.

Change 3 tens to 30 ones. *Divide* ones and *multiply.*

$15\overline{)1530}$

1 hundred
$15\overline{)15}$ hundreds
15

2 ones
$15\overline{)30}$ ones
30

$=$

$15\overline{)1530}$
15
30
30

Find the answers for the examples below. Check your work.

2.	$50\overline{)5050}$	$30\overline{)9060}$	$44\overline{)8844}$	$32\overline{)6496}$	$23\overline{)6946}$
3.	$37\overline{)7437}$	$48\overline{)9648}$	$26\overline{)5226}$	$38\overline{)7676}$	$24\overline{)9672}$
4.	$16\overline{)4864}$	$19\overline{)1938}$	$10\overline{)3090}$	$13\overline{)3965}$	$14\overline{)2842}$
5.	$16\overline{)3280}$	$14\overline{)5628}$	$17\overline{)6834}$	$12\overline{)7260}$	$18\overline{)5472}$

There will be remainders in the answers for the examples in rows 6 and 7. Find the answers.

6.	$20\overline{)6085}$	$30\overline{)9068}$	$40\overline{)8070}$	$50\overline{)5075}$	$60\overline{)6098}$
7.	$12\overline{)3669}$	$14\overline{)4238}$	$17\overline{)3460}$	$19\overline{)5746}$	$18\overline{)7250}$

Dividing Four-Place Numbers

1. A slow ocean freighter made a trip of 8240 miles in 40 days. What was the average distance traveled per day?

Change thousands to hundreds. *Divide*, *multiply*, and *subtract*.

Bring down tens. 24 is less than 40. Write 0 in tens' place in the quotient.

Bring down ones.

Change hundreds left to tens. *Change* tens to ones. *Divide* and *multiply*.

$40\overline{)8240}$

$$\begin{array}{r} 2 \text{ hundreds} \\ 40\overline{)82} \text{ hundreds} \\ \underline{80} \\ 2 \end{array}$$

$$\begin{array}{r} 6 \text{ ones} \\ 40\overline{)240} \text{ ones} \\ \underline{240} \end{array}$$

$=$

$$\begin{array}{r} 206 \\ 40\overline{)8240} \\ \underline{80} \\ 240 \\ \underline{240} \end{array}$$

Why were thousands changed to hundreds in the example above? Why were both tens and ones brought down before ones were divided?

How do you find the trial quotient for each partial dividend? Why do you write 0 in tens' place in the quotient?

Now find and check the answers for the examples below.

2. $20\overline{)6100}$ $30\overline{)9240}$ $20\overline{)8180}$ $56\overline{)5768}$ $67\overline{)6834}$

3. $23\overline{)9407}$ $32\overline{)9856}$ $48\overline{)9840}$ $25\overline{)7625}$ $84\overline{)8736}$

4. $15\overline{)1605}$ $13\overline{)1417}$ $14\overline{)2912}$ $12\overline{)3708}$ $16\overline{)4912}$

5. $19\overline{)3933}$ $17\overline{)5202}$ $16\overline{)3328}$ $14\overline{)4326}$ $15\overline{)6105}$

There are remainders in the answers for these examples:

6. $80\overline{)8298}$ $20\overline{)4113}$ $40\overline{)8375}$ $48\overline{)9876}$ $29\overline{)6050}$

7. $11\overline{)1200}$ $13\overline{)2700}$ $12\overline{)3700}$ $14\overline{)4328}$ $15\overline{)4630}$

8. $16\overline{)1677}$ $35\overline{)7292}$ $52\overline{)5695}$ $17\overline{)6889}$ $68\overline{)7051}$

9. $27\overline{)8291}$ $36\overline{)7251}$ $84\overline{)9094}$ $22\overline{)8895}$ $75\overline{)8034}$

Division Review and Practice

Copy the examples below, work, and check.

1.	27)540	19)765	30)610	14)712	41)861
2.	20)865	17)549	52)624	13)767	40)950
3.	40)1600	14)1129	30)1515	16)1133	65)1365
4.	52)1630	17)1109	20)1140	13)1274	90)1990
5.	27)5400	60)6054	31)9320	10)4000	14)1409
6.	48)9630	12)3611	20)6080	15)4575	30)9066
7.	30)6090	42)8442	24)9648	10)3080	11)2277
8.	54)5460	22)8869	39)7864	10)6059	16)4839
9.	40)4320	35)7245	29)8816	15)4635	17)3502
10.	50)5250	37)7548	17)5235	63)6820	11)3400
11.	50)5230	87)8899	47)9548	14)2925	16)4900
12.	16)704	18)1565	19)3859	18)5430	19)5833
13.	18)839	12)1128	18)3759	17)3415	13)4000

Solve these problems:

14. Mr. Merwin bought 8000 plants to plant in 40 equal rows. How many plants will he use in each row?

15. In December Tom's uncle gathered 2410 eggs. How many dozen eggs and how many extra eggs did he gather?

16. A farmer sold 14 pigs that weighed a total of 2842 pounds. What was the average weight per pig?

17. Mr. Thompson hauled 6075 pounds of wheat to the grain elevator. Wheat weighs 60 lb. per bushel. How many bushels of wheat were in the load?

Solving Problems

Read each problem below and answer each of these questions about it.

- What does the problem tell you?
- What question does it ask you?
- What should you do to find the answer to the question?

Then find the answer to the problem question. Remember:

If you need to:	*Then do this:*
Find how many in all	Add
Find the difference between two numbers	Subtract
Find how many in all of the equal groups	Multiply
Find how many equal groups Find how many in each equal group	Divide

1. The committee for the fifth-grade party bought fruit for \$1.50, milk for \$1.60, chocolate for 41¢, and 3 boxes of cookies at 90¢ a box. How much did they spend?

2. There were 24 cookies in each of the 3 boxes. How many cookies could each of the 28 people at the party have, and how many cookies would be left?

3. The children planned to make 2 cups of chocolate for each of the 28 people at the party. How many quarts of chocolate should they make? (4 cups = 1 quart)

4. John and his friends sold waste paper to earn money. The 13 boys earned \$14.17. How much was each boy's share?

5. A helicopter flies 30 miles a trip carrying mail from a village to the city post office. It makes 2 trips each day. How many miles will it fly in 20 days?

6. An empty truck weighed 6800 pounds. Loaded with coal it weighed 14,532 pounds. How much did the coal weigh?

7. Find the cost of 28 arithmetic books at \$1.59 each.

8. On a trip George and his father drove 429 miles in 11 hours. What was their average speed in miles per hour?

Review and Practice

Find the answers for the examples and problems below.

1.

$6\frac{1}{5}$	$8\frac{1}{8}$	$5\frac{7}{8}$	$\frac{3}{8}$	$9\frac{1}{12}$	$8\frac{1}{4}$	$7\frac{1}{2}$	$6\frac{3}{4}$
$+8\frac{3}{5}$	$+6\frac{5}{8}$	$+6\frac{5}{8}$	$+\frac{1}{2}$	$+\frac{3}{4}$	$+6\frac{1}{12}$	$+9\frac{9}{10}$	$+8\frac{1}{8}$

2.

$\frac{5}{7}$	$8\frac{9}{16}$	$9\frac{3}{8}$	$6\frac{3}{10}$	$\frac{5}{6}$	$6\frac{5}{8}$	$3\frac{2}{3}$	$9\frac{1}{2}$
$-\frac{2}{7}$	$-\frac{5}{16}$	$-2\frac{5}{8}$	$-5\frac{9}{10}$	$-\frac{1}{3}$	$-2\frac{1}{4}$	$-\frac{7}{9}$	$-2\frac{5}{8}$

3.

12301	\$570.10	\$348.02	76840	\$498.30
20132	397.05	659.41	35721	500.00
41003	841.62	764.35	94586	672.15
+16240	+960.21	+485.00	+67983	+786.29

4. $50\overline{)3500}$ $13\overline{)1085}$ $43\overline{)2666}$ $14\overline{)1320}$ $19\overline{)1273}$ $57\overline{)2462}$

5. $19\overline{)3800}$ $25\overline{)7550}$ $49\overline{)9849}$ $16\overline{)4870}$ $32\overline{)9824}$ $15\overline{)6130}$

6.

2500	3568	82000	\$64.00	\$32.75	\$268.50
−1232	−1749	−31984	−25.98	−15.84	−120.85

7.

357	1495	\$65.80	44	954	247	\$8.59
×6	×8	×5	×87	×32	×326	×125

8. Everett's father had a garden with an area of 1200 square feet. He needs 1 pound of fertilizer for each 25 square feet. How many pounds of fertilizer should he buy?

9. Mary helped her mother by spending $\frac{3}{4}$ of an hour cleaning the living room and $\frac{1}{4}$ of an hour washing dishes. How many hours did Mary help her mother?

10. In 5 days a carpenter worked $6\frac{1}{2}$ hours; 7 hours; $7\frac{1}{2}$ hours; $6\frac{1}{2}$ hours; and $7\frac{1}{2}$ hours. At \$2.65 an hour how much did he earn during the week?

11. The speedometer on Father's car read 19,876 at the start of a business trip and 20,005 at the end of the trip. At \$.06 a mile, what did the trip cost?

12. The fifth-grade party began at 2:15 p.m. and lasted until 3:45 p.m. How long did the party last?

To Help You Remember

The page numbers after the questions tell you where to turn for help if you need it.

▶ *To think and talk about:*

1. Why must you change $\frac{3}{4}$ to eighths before you can subtract $\frac{3}{8}$ from it? (213)

2. What is the common denominator for $\frac{2}{3}$ and $\frac{1}{6}$? Tell how you subtract $\frac{1}{6}$ from $\frac{2}{3}$. (214)

3. How do you reduce a fraction to its lowest terms? (107)

4. When the fraction in the minuend is smaller than the fraction in the subtrahend, what must you do before you can subtract? (Example: $3\frac{1}{2} - 1\frac{3}{4} = ?$) (150, 216)

5. Explain how you would find the answer to the division example, $34\overline{)6902}$. (223)

6. How do you find a trial quotient figure? (116, 181)

7. How can you tell whether the trial quotient figure is the true quotient figure? (114-16, 120, 181)

8. Explain the meaning of a picture graph. (219-20)

▶ *To think about and write:*

Find the answers for the examples and problems below.

1. $\frac{4}{8} = \frac{?}{2}$ (107)

2. $\frac{6}{10} = \frac{3}{?}$ (107)

3. $\frac{2}{3} = \frac{?}{9}$ (198)

4. $\frac{10}{8} = 1\frac{?}{?}$ (135)

5. $\frac{5}{6} - \frac{1}{6} = ?$ (146)

6. $\frac{5}{8} - \frac{1}{2} = ?$ (213)

7. $2\frac{1}{2}$
$\underline{-\frac{3}{4}}$ (214)

8. $3\frac{3}{4}$
$\underline{-1\frac{7}{8}}$ (218)

9. $6\frac{1}{6}$
$\underline{-2\frac{1}{2}}$ (218)

10. $7\frac{2}{3}$
$\underline{+\frac{4}{5}}$ (204)

11. $\frac{1}{3}$
$\underline{+\frac{2}{3}}$ (132)

12. $\frac{1}{2}$
$\underline{+\frac{3}{4}}$ (135)

13. $5\frac{2}{3}$
$\underline{+2\frac{1}{6}}$ (205)

14. $2\frac{1}{4}$
$\underline{+4\frac{5}{12}}$ (205)

15. $30\overline{)604}$ (178)

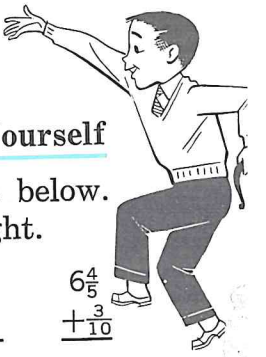
16. $46\overline{)968}$ (179)

17. $24\overline{)1450}$ (186)

18. $23\overline{)1426}$ (187)

19. $46\overline{)9249}$ (222)

20. $43\overline{)8729}$ (223)



Testing Yourself

Find the answers for the examples and problems below. Work quickly, but take time to get your answers right.

1.

$9\frac{4}{7}$	$3\frac{5}{16}$	$7\frac{4}{5}$	$5\frac{3}{4}$	$\frac{1}{4}$	$4\frac{2}{3}$	$5\frac{2}{3}$	$6\frac{4}{5}$
$+5\frac{2}{7}$	$+9\frac{3}{16}$	$+8\frac{2}{5}$	$+9\frac{3}{4}$	$+\frac{1}{12}$	$+7\frac{1}{9}$	$+4\frac{4}{9}$	$+\frac{3}{10}$

2.

$\frac{11}{12}$	$7\frac{7}{15}$	$5\frac{2}{7}$	$8\frac{1}{12}$	$\frac{7}{8}$	$9\frac{5}{6}$	$1\frac{3}{10}$	$8\frac{1}{10}$
$-\frac{5}{12}$	$-2\frac{4}{15}$	$-\frac{6}{7}$	$-4\frac{7}{12}$	$-\frac{3}{4}$	$-4\frac{1}{3}$	$-\frac{3}{5}$	$-6\frac{3}{5}$

3.

\$589.60	50478	37924	\$750.00	\$840.92
32.85	31692	89502	849.36	562.17
400.98	40735	16384	521.29	832.44
674.56	38469	55698	347.85	789.56

4. $30\overline{)2400}$ $16\overline{)1287}$ $75\overline{)2175}$ $17\overline{)1465}$ $19\overline{)1468}$ $30\overline{)2586}$

5. $16\overline{)6400}$ $32\overline{)9696}$ $46\overline{)9430}$ $17\overline{)6892}$ $25\overline{)7550}$ $13\overline{)5271}$

6.

3701	4783	76000	\$57.00	\$46.93	\$676.31
−1425	−1826	−42513	−32.75	−29.18	−367.34

7.

295	1738	\$73.41	65	738	237	\$9.16
×5	×9	×4	×92	×23	×462	×153

8. Two boys started on a hike to a lake $5\frac{1}{2}$ miles away. They walked $2\frac{3}{4}$ miles and stopped to rest. How many miles farther did they have to go?

9. The living room in Joan's home has dimensions of 13 feet by 24 feet. What is the area of the room?

10. Mr. Ross sold a truck load of oats weighing 6400 pounds. There are 32 pounds of oats to the bushel. At \$.85 a bushel how much was the load worth?

11. How many feet of fence are needed to build a fence around a garden 16 feet wide and 20 feet long?

12. Janet bought $\frac{1}{2}$ of a yard of cloth at \$.98 a yard and $\frac{3}{4}$ of a yard of ribbon at \$.20 a yard. What was the total cost of the cloth and ribbon Janet bought?

Chapter 15

A Visit to the Airport

Jerry and his father went to the airport to buy an airplane ticket for Los Angeles, California. They noticed a sign showing a special rate for Los Angeles.

1. How much money would Jerry's father save by buying a round-trip ticket instead of two one-way tickets?

2. A pilot told Jerry that he had made a 2585-mile trip in 11 hours. What was his average speed per hour?

3. Jerry learned that one of the runways was 7500 feet long. How many yards long was the runway?

4. A chart in the waiting room showed that 3330 planes arrived at the airport during November. What was the average number of planes that arrived per day during that month?

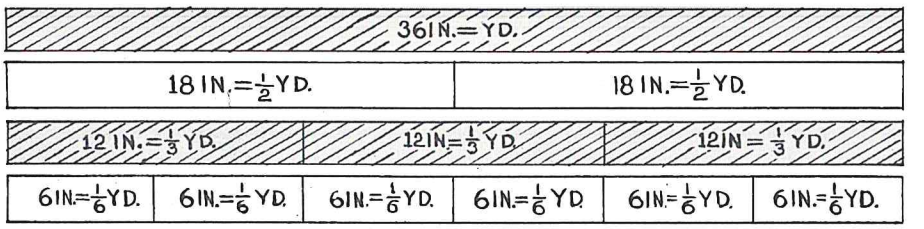
5. Each passenger on a plane is allowed 40 pounds of baggage without extra charge. If the plane carried 54 passengers, how many pounds of baggage would be accepted for the flight without extra charge?

6. Miss Johnson bought a $14.70 plane ticket for herself and one for her niece at half price. How much did she have to pay altogether for the tickets?

Changing Fractions to the Least Common Denominator

1. Barbara bought $\frac{1}{2}$ of a yard of white ribbon and $\frac{1}{3}$ of a yard of yellow ribbon to make badges for the ushers at the class play. What part of a yard of ribbon did she buy in all?

We add to find the total fraction of a yard bought. But $\frac{1}{2}$ and $\frac{1}{3}$ are unlike fractions. We cannot add them until we change them to like fractions. Study this drawing:


36 IN. = YD.
18 IN. = $\frac{1}{2}$ YD.
18 IN. = $\frac{1}{2}$ YD.
12 IN. = $\frac{1}{3}$ YD.
12 IN. = $\frac{1}{3}$ YD.
12 IN. = $\frac{1}{3}$ YD.
6 IN. = $\frac{1}{6}$ YD.
6 IN. = $\frac{1}{6}$ YD.
6 IN. = $\frac{1}{6}$ YD.
6 IN. = $\frac{1}{6}$ YD.
6 IN. = $\frac{1}{6}$ YD.
6 IN. = $\frac{1}{6}$ YD.

The drawing above helps you to see that 3 is not the common denominator because you cannot change $\frac{1}{2}$ to an even number of thirds. You must find the smallest number that can be divided evenly by both 2 and 3. The drawing will help you to see that this number is 6.

Does $\frac{1}{2}$ of a yard equal $\frac{3}{6}$ of a yard? Does $\frac{1}{3}$ of a yard equal $\frac{2}{6}$ of a yard?

To change $\frac{1}{2}$ to sixths, multiply both terms by 3.

To change $\frac{1}{3}$ to sixths, multiply both terms by 2.

Then you have two like fractions to add.

What is the sum of $\frac{3}{6}$ and $\frac{2}{6}$?

The least common denominator for 2 and 3 is the smallest number that can be divided evenly by both 2 and 3.

$$\begin{array}{r} \frac{1}{2} \\ +\frac{1}{3} \\ \hline ? \end{array}$$

$$\frac{3 \times 1}{3 \times 2} = \frac{3}{6}$$

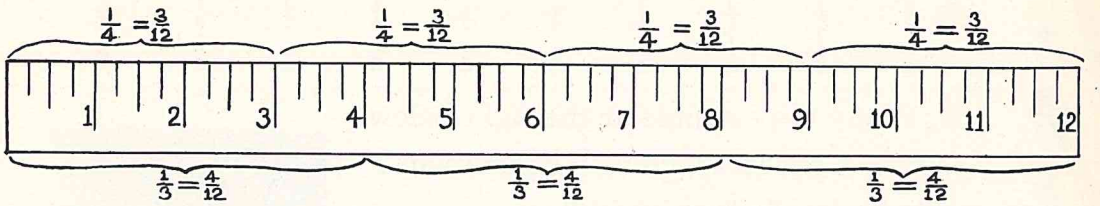
$$\frac{2 \times 1}{2 \times 3} = \frac{2}{6}$$

$$\begin{array}{r} \frac{1}{2} = \frac{3}{6} \\ +\frac{1}{3} = \frac{2}{6} \\ \hline \frac{5}{6} \end{array}$$

2. By what number would you multiply both terms of $\frac{1}{3}$ to change it to twelfths? How would you change $\frac{1}{4}$ to twelfths? $\frac{1}{2}$ to tenths? $\frac{1}{5}$ to tenths? $\frac{1}{4}$ to eighths?

Finding the Least Common Denominator

1. Change $\frac{1}{4}$ and $\frac{1}{3}$ to their least common denominator. Then find the sum. The picture of the ruler will help you discover the least common denominator for fourths and thirds.



You must find the smallest number that can be divided evenly by both 4 and 3. $8 = 2 \times 4$. Can 8 be divided evenly by 3? $12 = 3 \times 4$. Can 12 be divided evenly by 3? Do you see that 12 is the least common denominator for fourths and thirds? How can you prove it?

By what number should you multiply both terms of $\frac{1}{4}$ to change it to twelfths?

By what number should you multiply both terms of $\frac{1}{3}$ to change it to twelfths?

$$\begin{array}{r} \frac{1}{4} = \frac{3}{12} \\ +\frac{1}{3} = \frac{4}{12} \\ \hline \frac{7}{12} \end{array}$$

Change the fractions in each example below to the least common denominator and find the sum.

2.

$\frac{1}{3}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{2}{5}$	$\frac{1}{7}$	$\frac{2}{7}$	$\frac{1}{3}$	$\frac{1}{6}$	$\frac{1}{5}$	$\frac{1}{3}$
$\frac{1}{5}$	$\frac{1}{6}$	$\frac{1}{5}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{2}{5}$

3.

$\frac{1}{2}$	$\frac{3}{7}$	$\frac{2}{3}$	$\frac{1}{6}$	$\frac{1}{9}$	$\frac{1}{7}$	$\frac{4}{9}$	$\frac{2}{3}$	$\frac{1}{6}$	$\frac{1}{3}$
$\frac{2}{5}$	$\frac{1}{2}$	$\frac{1}{5}$	$\frac{1}{8}$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{1}{5}$	$\frac{1}{9}$	$\frac{2}{7}$

4. $\frac{1}{9} + \frac{5}{6} = ?$ $\quad \frac{2}{5} + \frac{1}{3} = ?$ $\quad \frac{1}{2} + \frac{2}{9} = ?$ $\quad \frac{2}{3} + \frac{1}{7} = ?$

5. $\frac{3}{8} + \frac{1}{3} = ?$ $\quad \frac{1}{3} + \frac{1}{8} = ?$ $\quad \frac{1}{6} + \frac{5}{9} = ?$ $\quad \frac{1}{5} + \frac{1}{6} = ?$

Now you have learned:

- The least common denominator for two or more fractions will be the smallest number that can be divided evenly by the denominators of all the fractions.

More Addition with Unlike Fractions

Use three steps in finding the answer to examples in row 1. *First*, find the least common denominator. *Second*, change both fractions to like fractions. *Third*, add the numerators.

1. $\frac{2}{3}$	$\frac{1}{2}$	$\frac{3}{5}$	$\frac{3}{4}$	$\frac{1}{6}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{2}{5}$	$\frac{1}{2}$	$\frac{1}{3}$
$+\frac{1}{4}$	$+\frac{1}{5}$	$+\frac{1}{3}$	$+\frac{1}{5}$	$+\frac{1}{4}$	$+\frac{1}{8}$	$+\frac{3}{5}$	$+\frac{1}{2}$	$+\frac{1}{3}$	$+\frac{2}{5}$

2. Study the example at the right below.

Why is 6 the least common denominator?

What kind of a fraction is $\frac{7}{6}$?

What kind of a number is $1\frac{1}{6}$?

How do you change $\frac{7}{6}$ to $1\frac{1}{6}$?

$$\begin{aligned} \tfrac{1}{2} &= \tfrac{3}{6} \\ +\tfrac{2}{3} &= \tfrac{4}{6} \\ \hline \tfrac{7}{6} &= 1\tfrac{1}{6} \end{aligned}$$

Add these examples and change the sums to mixed numbers:

3. $\frac{1}{2}$	$\frac{1}{3}$	$\frac{4}{5}$	$\frac{1}{2}$	$\frac{5}{6}$	$\frac{2}{3}$	$\frac{4}{5}$	$\frac{1}{2}$	$\frac{4}{5}$	$\frac{3}{4}$
$+\frac{3}{5}$	$+\frac{3}{4}$	$+\frac{1}{2}$	$+\frac{4}{9}$	$+\frac{1}{4}$	$+\frac{3}{4}$	$+\frac{1}{4}$	$+\frac{4}{7}$	$+\frac{1}{3}$	$+\frac{5}{6}$

In the examples below add the fractions first and then the whole numbers. In some of the examples you will have to change the sum of the fractions to a mixed number and add it to the sum of the whole numbers. Sometimes you will have to reduce the fraction in the sum to lowest terms.

4. $2\frac{1}{4}$	$5\frac{1}{5}$	$7\frac{1}{3}$	$\frac{3}{4}$	$8\frac{1}{2}$	$5\frac{1}{3}$	$6\frac{1}{2}$	$9\frac{1}{2}$
$+\frac{1}{6}$	$+\frac{1}{3}$	$+\frac{1}{4}$	$+4\frac{1}{3}$	$+\frac{2}{3}$	$+2\frac{1}{2}$	$+8\frac{1}{5}$	$+4\frac{2}{5}$

5. $6\frac{2}{3}$				$3\frac{1}{4}$	$3\frac{5}{8}$	$2\frac{1}{6}$	$4\frac{1}{3}$
$2\frac{1}{12}$	$3\frac{1}{2}$	$8\frac{2}{3}$	$7\frac{1}{4}$	$4\frac{1}{3}$	$2\frac{1}{4}$	$6\frac{3}{4}$	$2\frac{1}{2}$
$+5\frac{3}{4}$	$+5\frac{2}{3}$	$+4\frac{2}{5}$	$+6\frac{5}{6}$	$+2\frac{1}{2}$	$+1\frac{1}{6}$	$+8\frac{1}{3}$	$+5\frac{5}{6}$

6. What is the perimeter of a table that is $2\frac{1}{4}$ feet wide and $4\frac{3}{4}$ feet long?

7. The pupils in the school orchestra practiced $1\frac{1}{3}$ hours last week and $2\frac{1}{2}$ hours this week. How many hours did they practice altogether in the two weeks?

8. Find the sum of $\frac{1}{2}$ of a mile and $\frac{1}{5}$ of a mile.

Subtracting Unlike Fractions

1. Jane had $\frac{2}{3}$ of a yard of material. She used $\frac{1}{2}$ of a yard to make doll clothes. How much of the material was left?

You must subtract to find the answer. Why?

Study the example at the right. Are the fractions $\frac{2}{3}$ and $\frac{1}{2}$ like, or unlike fractions?

$$\begin{array}{r} \frac{2}{3} = \frac{4}{6} \\ -\frac{1}{2} = \frac{3}{6} \\ \hline \frac{1}{6} \end{array}$$

What can you do to change $\frac{2}{3}$ and $\frac{1}{2}$ to like fractions?

What is the least common denominator for $\frac{2}{3}$ and $\frac{1}{2}$?

By what number should you multiply both terms of $\frac{2}{3}$ to change it to sixths? How do you change $\frac{1}{2}$ to sixths?

What is the answer to the problem question?

Copy and subtract:

2.

$\frac{2}{3}$	$\frac{1}{2}$	$\frac{3}{5}$	$\frac{4}{5}$	$\frac{2}{3}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}$
$\frac{1}{4}$	$\frac{1}{5}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{3}{5}$	$\frac{1}{3}$	$\frac{2}{7}$	$\frac{1}{6}$	$\frac{2}{5}$	$\frac{1}{3}$

3.

$\frac{4}{5}$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{2}{3}$	$\frac{3}{5}$	$\frac{2}{3}$	$\frac{4}{5}$	$\frac{1}{2}$	$\frac{1}{6}$	$\frac{1}{4}$
$\frac{2}{3}$	$\frac{1}{7}$	$\frac{1}{4}$	$\frac{2}{5}$	$\frac{1}{3}$	$\frac{5}{8}$	$\frac{1}{3}$	$\frac{1}{9}$	$\frac{1}{8}$	$\frac{1}{6}$

4. Jane had one apron pattern that called for $\frac{3}{4}$ of a yard of cloth and a second pattern that called for $\frac{2}{3}$ of a yard. How much less cloth will she need if she uses the second pattern instead of the first?

5. If John's father buys a small fan for the attic he can use a $\frac{1}{6}$ horsepower motor to turn the fan. He will use a $\frac{1}{4}$ horsepower motor if he gets a larger fan. What is the difference in horsepower between the two motors?

Subtracting Unlike Fractions from Mixed Numbers

1. Judy had $1\frac{1}{4}$ yards of tape. She used $\frac{1}{3}$ of a yard for making a scrap book tie. How much tape did she have left?

You must subtract to find the answer.

$$1\tfrac{1}{4} = 1\tfrac{3}{12} = \tfrac{15}{12}$$
$$-\tfrac{1}{3} = \tfrac{4}{12} = \tfrac{4}{12}$$
$$\tfrac{11}{12}$$

Since you cannot subtract unlike fractions, $\frac{1}{4}$ and $\frac{1}{3}$ must be changed to like fractions by changing them to a common denominator.

What is the least common denominator for $\frac{1}{4}$ and $\frac{1}{3}$?

Since $\frac{4}{12}$ is larger than $\frac{3}{12}$, change the 1 in the minuend to $\frac{12}{12}$ and add it to the $\frac{3}{12}$. Then subtract $\frac{4}{12}$ from $\frac{15}{12}$.

What is the answer for the question in the problem?

Find the answers for these subtraction examples:

2.

$1\frac{1}{3}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{3}$	$1\frac{1}{4}$	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{1}{5}$	$1\frac{1}{4}$
$\frac{1}{2}$	$\frac{4}{5}$	$\frac{5}{7}$	$\frac{2}{3}$	$\frac{3}{4}$	$\frac{2}{3}$	$\frac{4}{5}$	$\frac{3}{5}$	$\frac{1}{2}$	$\frac{5}{6}$

3. In the example at the right there are ones left in the difference.

$$4\tfrac{3}{4} = 4\tfrac{9}{12} = 3\tfrac{21}{12}$$
$$-\tfrac{5}{6} = \tfrac{10}{12} = \tfrac{10}{12}$$
$$3\tfrac{11}{12}$$

Tell how $\frac{3}{4}$ and $\frac{5}{6}$ were changed to like fractions.

How was $4\frac{9}{12}$ changed to $3\frac{21}{12}$?

What is the answer?

Find the answers for the subtraction examples below. Sometimes the least common denominator is the denominator of one of the fractions. Sometimes it is another larger number. The fraction in some answers must be reduced to lowest terms.

4.

$8\frac{1}{4}$	$6\frac{1}{3}$	$4\frac{1}{4}$	$3\frac{1}{5}$	$2\frac{1}{2}$	$4\frac{1}{2}$	$8\frac{1}{3}$	$5\frac{1}{2}$	$2\frac{1}{4}$
$\frac{2}{3}$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{5}{7}$	$\frac{2}{3}$	$\frac{3}{4}$	$\frac{4}{5}$	$\frac{5}{6}$

5.

$6\frac{1}{2}$	$3\frac{1}{4}$	$2\frac{1}{2}$	$7\frac{1}{3}$	$5\frac{1}{5}$	$9\frac{2}{5}$	$4\frac{1}{3}$	$8\frac{3}{4}$	$3\frac{5}{6}$
$\frac{1}{4}$	$\frac{1}{16}$	$\frac{9}{10}$	$\frac{5}{6}$	$\frac{7}{10}$	$\frac{9}{10}$	$\frac{1}{9}$	$\frac{1}{12}$	$\frac{7}{12}$

6.

$1\frac{2}{5}$	$4\frac{1}{2}$	$8\frac{1}{2}$	$3\frac{1}{3}$	$2\frac{2}{3}$	$9\frac{1}{4}$	$6\frac{7}{15}$	$5\frac{1}{12}$	$7\frac{1}{3}$
$\frac{1}{10}$	$\frac{1}{10}$	$\frac{7}{10}$	$\frac{4}{9}$	$\frac{5}{6}$	$\frac{7}{8}$	$\frac{4}{5}$	$\frac{5}{6}$	$\frac{4}{5}$

Subtracting Mixed Numbers

1. Mark had a board $6\frac{1}{2}$ feet long. He cut off a piece $2\frac{2}{3}$ feet long. How long was the piece that was left?

You cannot subtract thirds from halves because they are unlike fractions.

To change them to like fractions, you must change them to a common denominator as at the right. But $\frac{4}{6}$ is larger than $\frac{3}{6}$, so you must change 1 one to $\frac{6}{6}$ and add it to the $\frac{3}{6}$. Then you can subtract. What is the answer?

$$\begin{array}{r} 6\frac{1}{2} = 6\frac{3}{6} = 5\frac{9}{6} \\ \underline{-2\frac{2}{3} = 2\frac{4}{6} = 2\frac{4}{6}} \\ 3\frac{5}{6} \end{array}$$

Find the answers for these subtraction examples and problems. Sometimes one of the denominators is the common denominator. Be sure that all answers are reduced to lowest terms.

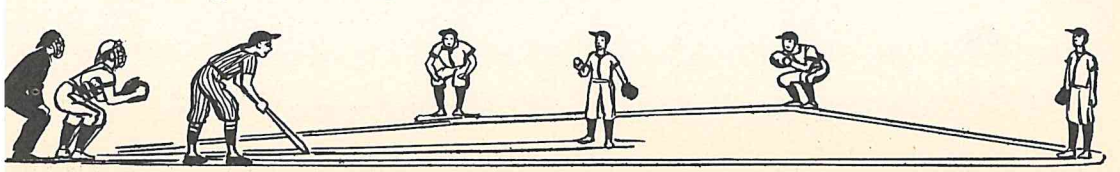
2.	$4\frac{1}{2}$	$9\frac{1}{3}$	$7\frac{1}{5}$	$5\frac{1}{3}$	$3\frac{1}{3}$	$8\frac{1}{2}$	$6\frac{1}{4}$	$5\frac{3}{4}$	$4\frac{1}{4}$
	$1\frac{3}{5}$	$3\frac{1}{2}$	$2\frac{1}{2}$	$4\frac{3}{4}$	$1\frac{4}{5}$	$2\frac{4}{5}$	$4\frac{1}{3}$	$2\frac{5}{6}$	$2\frac{2}{3}$
3.	$2\frac{1}{3}$	$7\frac{1}{2}$	$6\frac{1}{6}$	$4\frac{2}{3}$	$8\frac{1}{2}$	$9\frac{1}{4}$	$5\frac{3}{4}$	$3\frac{3}{4}$	$7\frac{3}{5}$
	$1\frac{1}{4}$	$4\frac{1}{3}$	$2\frac{1}{8}$	$2\frac{3}{5}$	$4\frac{1}{5}$	$7\frac{1}{6}$	$4\frac{2}{3}$	$1\frac{1}{6}$	$6\frac{1}{2}$
4.	$7\frac{1}{2}$	$3\frac{1}{2}$	$6\frac{2}{5}$	$8\frac{1}{8}$	$5\frac{2}{3}$	$9\frac{1}{4}$	$4\frac{1}{12}$	$2\frac{1}{2}$	$8\frac{2}{3}$
	$5\frac{5}{6}$	$2\frac{7}{8}$	$4\frac{9}{10}$	$5\frac{1}{4}$	$3\frac{8}{9}$	$7\frac{5}{12}$	$2\frac{1}{4}$	$1\frac{1}{12}$	$6\frac{1}{6}$
5.	$6\frac{7}{12}$	$8\frac{5}{12}$	$7\frac{4}{5}$	$4\frac{1}{2}$	$9\frac{1}{2}$	$5\frac{2}{3}$	$3\frac{3}{8}$	$6\frac{5}{12}$	$7\frac{1}{9}$
	$2\frac{1}{3}$	$4\frac{1}{6}$	$5\frac{2}{15}$	$2\frac{1}{8}$	$4\frac{5}{8}$	$2\frac{5}{6}$	$1\frac{3}{4}$	$5\frac{2}{3}$	$5\frac{1}{2}$

6. Susan is $4\frac{1}{2}$ feet tall and her little brother is $3\frac{1}{4}$ feet tall. How much taller is Susan than her brother?

7. On Friday the baseball game was played in $1\frac{3}{4}$ hours. The Saturday game lasted $2\frac{1}{2}$ hours. How much longer did the Saturday game last than the Friday game?

8. John's mother made a meat loaf. She used $2\frac{1}{4}$ pounds of ground beef and $\frac{3}{4}$ of a pound of ground pork. How many more pounds of beef than pork did she use?

9. Bill had a board $6\frac{1}{3}$ feet long. He sawed off a piece $2\frac{1}{2}$ feet long. How long was the piece that was left?



Problems to Solve

Read each problem to find out what it tells and what you are asked to find. Decide how to answer the question, and write A, S, M, or D. If it is a two-step problem write A, S, M, or D for each step. Then find the answer.

1. The Girl Scouts went with their leader on a hike one Saturday. They walked $4\frac{3}{4}$ miles to a woodland park. They took a different route back, walking $5\frac{1}{3}$ miles. How much longer was the walk back than the walk to the park?

2. Mary's mother bought $3\frac{1}{2}$ pounds of peaches and $4\frac{3}{4}$ pounds of apples. How many pounds of fruit did she buy?

3. Jack bought 2 dozen eggs at 75¢ a dozen and a pound of cheese for 89¢. How much did he spend?

4. Betty can buy a 1-pound jar of peanut butter for 39¢. She can get 8-ounce jars at 25¢ each. How much can she save by buying the pound jar instead of two 8-ounce jars?

5. Mrs. Brown paid the milk bill. It was $8.75. How much change should she get from $10.00?

6. Hazel's mother cut a pie into 6 pieces. The family ate $\frac{2}{3}$ of the pie for dinner. How many pieces were left?

7. Lorraine helped her mother by spending $\frac{1}{2}$ of an hour washing dishes, $\frac{3}{4}$ of an hour cleaning the living room, and $\frac{1}{3}$ of an hour cleaning her bedroom. How many hours did Lorraine spend helping her mother?

8. Mr. Adams, the milkman, delivered 5600 quart bottles of milk in 2 weeks. What was the average number of bottles delivered per day?

9. In the Washington School the children in the first three grades are in 5 rooms. In one room there are 22 children. In the others there are 24, 22, 27, and 25. What is the average number of children per room?

10. Jim and his father have a garden that is 20 feet wide and 45 feet long. What is the area of the garden?

Dividing Hundreds and Tens in Four-Place Numbers

1. In 31 days the bus driver collected 9920 dimes. What was the average number of dimes collected per day?

Divide: $31\overline{)9920}$

Change the thousands to hundreds. *Divide*, *multiply* and *subtract*.

Bring down the tens.

Change the hundreds that are left to tens. *Divide* and *multiply*.

Bring down zero. There are no ones to divide, so write 0 in ones' place in the quotient. What is the answer?

$$\begin{array}{r} 3 \text{ hundreds} \\ 31\overline{)99} \text{ hundreds} \\ \underline{93} \\ 6 \\ \\ 2 \text{ tens} \\ 31\overline{)62} \text{ tens} \\ \underline{62} \end{array} \quad = \quad \begin{array}{r} 320 \\ 31\overline{)9920} \\ \underline{93} \\ 62 \\ \underline{62} \\ 0 \end{array}$$

Copy the examples below and divide. There are remainders in the answers for the examples in rows 3 and 4.

2. $10\overline{)8500}$ $30\overline{)6900}$ $40\overline{)4800}$ $21\overline{)8820}$ $47\overline{)5640}$

3. $25\overline{)5253}$ $65\overline{)7159}$ $22\overline{)6825}$ $39\overline{)8586}$ $24\overline{)7687}$

4. $12\overline{)1570}$ $14\overline{)2950}$ $16\overline{)3690}$ $20\overline{)8210}$ $53\overline{)5870}$

Dividing Four-Place Numbers

1. A farmer harvested 3904 pounds of oats which he sold by the bushel. Oats weigh 32 pounds to the bushel. How many bushels did the farmer have to sell?

To find the answer, you divide 3904 by 32. Do it this way:

$$\begin{array}{r} 122 \\ 32\overline{)3904} \\ 32 \\ \hline 70 \\ 64 \\ \hline 64 \\ 64 \\ \hline \end{array}$$

Change thousands in the dividend to hundreds. *Divide* 39 hundreds by 32. *Multiply* and *subtract.*

Bring down the 0 in tens' place.

Change hundreds that are left to tens. *Divide* 70 tens by 32. *Multiply* and *subtract.*

Bring down the ones.

Change tens left to ones. *Divide* 64 ones by 32. *Multiply.*

What is the answer to the question in the problem?

Find the answers for the examples and problems below. There will be remainders in some of the answers.

2.	$20\overline{)6480}$	$30\overline{)9960}$	$40\overline{)8480}$	$56\overline{)6216}$	$67\overline{)7437}$
3.	$36\overline{)7632}$	$42\overline{)5082}$	$27\overline{)8667}$	$45\overline{)9945}$	$39\overline{)8268}$
4.	$10\overline{)1110}$	$11\overline{)2574}$	$12\overline{)2784}$	$18\overline{)3978}$	$13\overline{)4173}$
5.	$17\overline{)5457}$	$19\overline{)8056}$	$14\overline{)4788}$	$16\overline{)8240}$	$11\overline{)5786}$
6.	$30\overline{)9639}$	$72\overline{)8012}$	$56\overline{)6234}$	$41\overline{)9111}$	$32\overline{)9999}$
7.	$10\overline{)9876}$	$11\overline{)5909}$	$12\overline{)4095}$	$13\overline{)4320}$	$15\overline{)6800}$
8.	$24\overline{)9892}$	$15\overline{)7986}$	$12\overline{)7505}$	$24\overline{)7756}$	$17\overline{)7000}$

9. If you use 1 pound of fertilizer for each 24 square feet of lawn, how much would you need for 7992 square feet?

10. Janet's mother bought 8 chairs for the recreation room. She paid $78.00. What was the cost of each chair?

11. What is the answer when you divide $49.20 by 24?

More about Dividing Four-Place Numbers

You remember that in dividing three-place and four-place numbers you use part of the dividend in finding each quotient figure. These parts are called partial dividends.

Study the example at the right.

$$\begin{array}{r} 336 \\ 25\overline{)8400} \\ 75 \\ \hline 90 \\ 75 \\ \hline 150 \\ 150 \\ \hline \end{array}$$

1. What are the three partial dividends in this example?

2. What is the first trial quotient figure? Is it the true quotient figure?

3. How do you find out whether the trial quotient figure is too large?

4. If the trial quotient figure is too large, what do you do to find the true quotient figure?

Find the answers for the examples below. There will be remainders in some of the answers.

5.	$30\overline{)9780}$	$82\overline{)9266}$	$77\overline{)8624}$	$67\overline{)7571}$	$53\overline{)6042}$
6.	$34\overline{)7650}$	$45\overline{)9585}$	$59\overline{)6844}$	$43\overline{)9288}$	$61\overline{)6954}$
7.	$18\overline{)2088}$	$17\overline{)2142}$	$15\overline{)3255}$	$19\overline{)4142}$	$14\overline{)5026}$
8.	$12\overline{)8028}$	$18\overline{)4104}$	$19\overline{)6004}$	$14\overline{)9086}$	$13\overline{)8047}$
9.	$60\overline{)6895}$	$40\overline{)8948}$	$30\overline{)9850}$	$31\overline{)9900}$	$22\overline{)9660}$
10.	$11\overline{)4949}$	$12\overline{)8999}$	$13\overline{)7000}$	$18\overline{)5880}$	$17\overline{)4050}$
11.	$28\overline{)9158}$	$16\overline{)5397}$	$15\overline{)6879}$	$27\overline{)6095}$	$15\overline{)7934}$

Answer these questions:

12. If you know how much each of several boys weighs, how do you find the average weight?

13. If you know the cost of each of several items bought and the amount of money used in payment, how do you find the amount of change you should receive?

Checking Sales Slips

The store clerk multiplied 2 × $3.98 to find the cost of the curtains in the sales slip below. The sign @ is read *at* and tells that the price following it is for one article.

T. E. BROWN
Dry Goods
Sold To Mrs. Walter Jones
Address 141 Walnut St.

2 pr.	Curtains @	3	98	7	96
2	Curtain rods		39		
4 pkg.	Needles		10		
8 yd.	Braid		08		
2 pr.	Stockings	2	39		
	Total				

1. Which column is used to tell the number of articles bought?

2. Which column is used to tell the price of each article?

3. Which column is used to tell the cost of each of the items listed?

4. Find the cost of each of the different things bought by Mrs. Brown.

5. Find the total cost of all of the things bought by Mrs. Brown.

6. Check the two sales slips shown below. Check the cost of each item. Then check the addition in the last column.

4 lb.	Butter @	89	3	56
3 doz.	Eggs	75	2	35
3 lb.	ground meat	58	1	74
2 lb.	Coffee	92	1	84
2 doz.	Oranges	45		90
	Total		10	39

6	Towels @	79	4	74
3	Blankets	9 50	28	50
4	Sheets	2 95	11	80
2	Bedspreads	7 79	15	58
5 yd.	Cotton Cloth	67	3	35
	Total		63	97

7. Did you find any errors?

8. Why does it pay to check sales slips before leaving a store?

9. Find the cost of 4 lbs. of butter at 89¢ a pound and a dozen oranges at 45¢ a dozen.

10. How much change would you receive if you bought 3 dozen eggs at 75¢ a dozen and paid with a 5-dollar bill?

Problems to Solve

Decide what would be a sensible answer for each problem. Then solve the problem. Was your estimate about right?

1. Mr. Adams bought 16 boxes of apples at \$2.35 a box. He sold them for \$3.25 a box. How much money did he gain?

2. Mr. Adams bought 3 boxes of apples that held 40 pounds each. He repacked the apples in bags that held 5 pounds each. How many bags did he fill?

3. Mr. Smith and his neighbor shared the cost of 3 bags of seed potatoes at \$4.20 a bag. How much did each man pay?

4. Joe earned \$1.20 in January, \$1.06 in February, and \$.80 in March. What were his average earnings per month?

5. The picnic committee spent \$2.05 for pop at \$.05 a bottle. The children drank all but 11 bottles. How many bottles of pop did the children drink?

6. Betty had a spool of ribbon 12 yards long. She cut it into 18 equal pieces. How many inches long was each piece?

7. Mary Jane read about a coal mine that produced 90,105 tons of coal in 15 months. What was the average amount produced per month?

8. A painter paid \$105.20 for 20 gallons of paint. What was the cost per gallon?

9. What is the cost of each orange if 3 dozen cost \$1.80?

10. When Mr. Woods sold his car, he had driven it 60,135 miles. If he averaged 15 miles on a gallon of gasoline, how many gallons of gasoline had the car used?

Review and Practice

Find the answers for the examples and problems on this page.

Add:

1.

$4\frac{5}{8}$	$6\frac{2}{3}$	$8\frac{4}{5}$	$7\frac{11}{12}$	$2\frac{1}{2}$	$4\frac{1}{2}$	$3\frac{3}{4}$	$4\frac{1}{4}$
$7\frac{1}{8}$	$8\frac{1}{3}$	$5\frac{3}{4}$	$6\frac{7}{12}$	$3\frac{1}{6}$	$6\frac{7}{8}$	$7\frac{7}{12}$	$7\frac{5}{6}$

2.

1010	107	4932	7030	1602	5632	$80.97
3500	1495	706	5905	2000	1759	40.56
15	6	5821	1050	3007	4261	71.75
150	50	339	2509	4990	1839	19.98
2224	319	47	1000	3250	3675	25.00
7	2600	1342	4206	3005	3164	37.50

Subtract:

3.

504	4007	8703	6008	7253	9142	$80.00
367	539	3745	2789	6274	5364	69.98

4.

$6\frac{4}{5}$	$9\frac{5}{6}$	$9\frac{3}{4}$	$7\frac{4}{9}$	$8\frac{1}{2}$	$4\frac{1}{12}$	$7\frac{1}{3}$	$9\frac{1}{2}$
$2\frac{3}{5}$	$4\frac{1}{6}$	$7\frac{1}{2}$	$3\frac{2}{3}$	$5\frac{5}{6}$	$3\frac{1}{3}$	$2\frac{1}{4}$	$5\frac{2}{3}$

Multiply:

5.

700	209	890	957	435	$9.98	$18.45
86	57	45	23	98	25	34

6.

200	805	560	658	935	$5.25	$7.50
324	364	432	234	453	395	268

Divide:

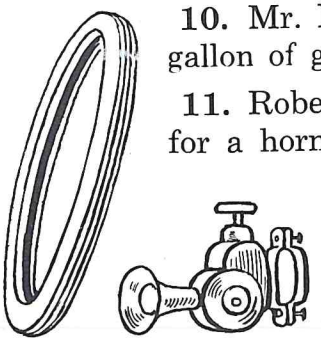
7. $17\overline{)1207}$ $15\overline{)1305}$ $73\overline{)2298}$ $18\overline{)1380}$ $51\overline{)\$60.18}$

8. $14\overline{)4205}$ $24\overline{)7248}$ $46\overline{)9250}$ $15\overline{)3145}$ $\$.34\overline{)\$76.16}$

9. How many dozen eggs are 9720 eggs?

10. Mr. Mills drove 1173 miles. He averaged 17 miles to a gallon of gas. At $.29 a gallon, how much did the gas cost?

11. Robert paid $1.80 for a new tire for his bicycle and $.95 for a horn. How much change should he receive from $5?



To Help You Remember

The numbers after the questions are page numbers that tell you where to turn for help if you need it.

▶ *To think and talk about:*

1. How do you change unlike fractions to like fractions? (230)

2. Why can't you add or subtract unlike fractions before changing them to like fractions? (199, 213, 232-33)

3. What is the least common denominator of $\frac{1}{3}$ and $\frac{1}{4}$? (231)

4. What is the least common denominator of $\frac{1}{2}$ and $\frac{2}{3}$? (232)

5. Tell how you change $\frac{3}{4}$ to twelfths. (231)

6. Tell how you change $\frac{6}{8}$ to fourths. (107)

Answer the following questions about the example at the right. (239)

```
      336
25)8400
   75
   ---
   90
   75
   ---
   150
   150
   ---
```

7. Why must you change thousands to hundreds before you can divide? (238)

8. How many partial dividends do you use in working the example? (177, 238)

9. How do you find the trial quotient figure for each partial dividend? (178, 181)

10. Is the trial quotient figure for any partial dividend also the true quotient figure?

11. How do you find the true quotient figure for each partial dividend? (116)

▶ *To think about and write:*

Find the answers for these examples:

1. $\frac{1}{5} + \frac{2}{5}$ (129) $\frac{1}{4} + \frac{1}{4}$ (131) $\frac{3}{8} + \frac{7}{8}$ (136) $\frac{3}{4} + \frac{7}{12}$ (201) $\frac{1}{2} + \frac{1}{3}$ (230)

2. $\frac{2}{3} - \frac{1}{3}$ (145) $\frac{5}{8} - \frac{3}{8}$ (146) $\frac{1}{2} - \frac{1}{4}$ (213) $1\frac{1}{2} - \frac{7}{8}$ (214) $\frac{1}{2} - \frac{1}{3}$ (233) $1\frac{1}{2} - \frac{2}{3}$ (234)

3. $50\overline{)5500}$ $27\overline{)6235}$ $10\overline{)3750}$ $19\overline{)8072}$ (238, 239)

4. $\frac{3}{4}$ of 16 = ? $\frac{2}{3}$ of 18 = ? $\frac{1}{2}$ of 24 = ? $\frac{1}{6}$ of 72 = ? (45)

5. 5800 − 1327 (71) 4295 + 3867 (68) 2754 × 27 (170)

Testing Yourself

Find the answers for the examples and problems on this page.

Add:

1. $4\frac{2}{5}$ $8\frac{2}{9}$ $5\frac{2}{3}$ $7\frac{5}{6}$ $1\frac{1}{4}$ $6\frac{1}{3}$ $7\frac{1}{2}$ $8\frac{1}{2}$
$3\frac{1}{5}$ $5\frac{4}{9}$ $1\frac{2}{3}$ $2\frac{5}{6}$ $4\frac{5}{12}$ $3\frac{11}{12}$ $5\frac{2}{5}$ $6\frac{2}{3}$

2.

3251	702	6739	2013	4623	3214	$60.59
303	8130	428	1632	5961	4139	37.80
1324	132	327	4000	3287	6255	49.53
622	2252	3256	6700	5432	4426	13.27
31	342	1001	2930	6212	4390	17.50
321	65	7319	6172	3888	7061	12.98

Subtract:

3.

302	3070	7633	5007	6392	4839	$93.04
195	662	4954	3546	3786	2776	56.38

4. $7\frac{3}{5}$ $4\frac{3}{8}$ $8\frac{3}{4}$ $9\frac{1}{8}$ $7\frac{2}{5}$ $6\frac{1}{2}$ $8\frac{1}{6}$ $7\frac{2}{3}$
$1\frac{2}{5}$ $3\frac{1}{8}$ $5\frac{1}{8}$ $1\frac{3}{4}$ $5\frac{1}{15}$ $4\frac{3}{4}$ $3\frac{11}{12}$ $1\frac{3}{5}$

Multiply:

5.

705	200	730	438	625	$6.35	$12.75
82	52	76	67	25	33	45

6.

400	706	850	727	852	$7.37	$5.22
415	273	354	338	542	2 47	3 19

Divide:

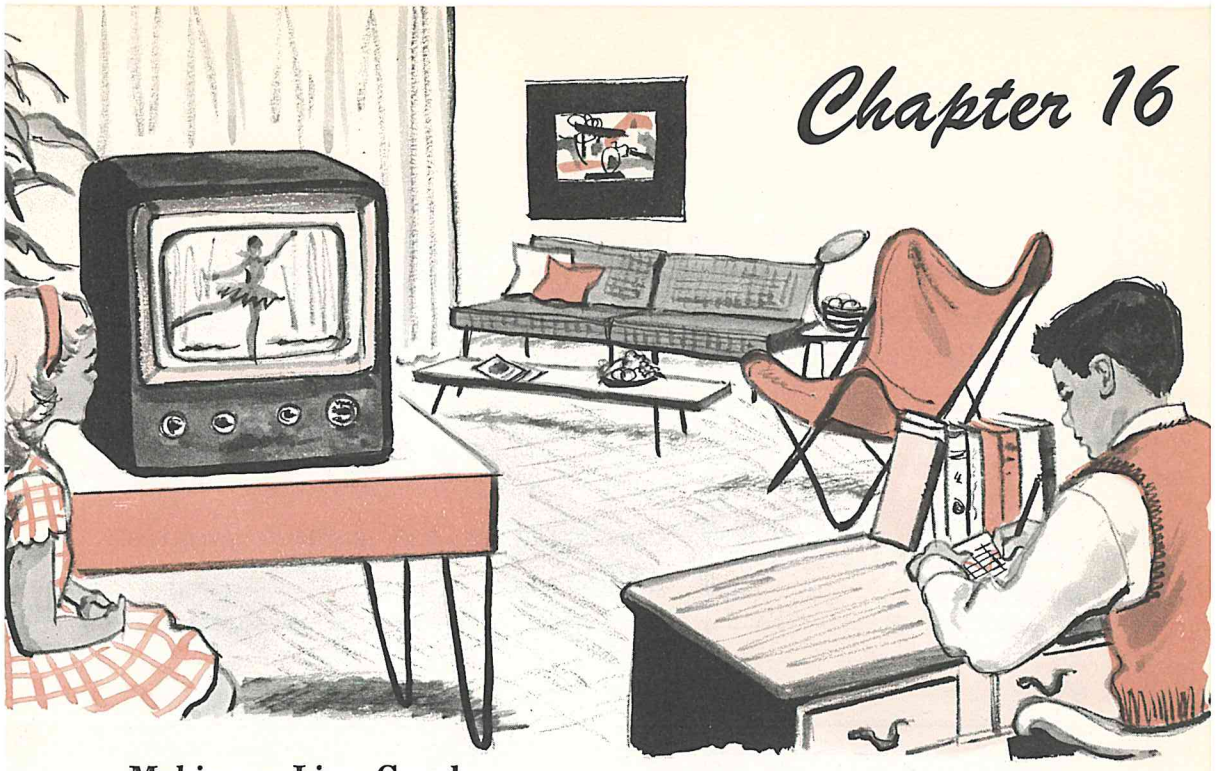
7. $15\overline{)1305}$ $46\overline{)3634}$ $16\overline{)1114}$ $17\overline{)1006}$ $32\overline{)\$38.72}$

8. $17\overline{)3403}$ $37\overline{)7308}$ $27\overline{)5487}$ $13\overline{)2717}$ $\$.41\overline{)\$89.63}$

9. John read that a steamboat made an 1120-mile trip in 56 hours. What was its average speed per hour?

10. Ruth's mother bought 2 boxes of peaches weighing 38 pounds each. She paid $4.56. What was the price per pound?

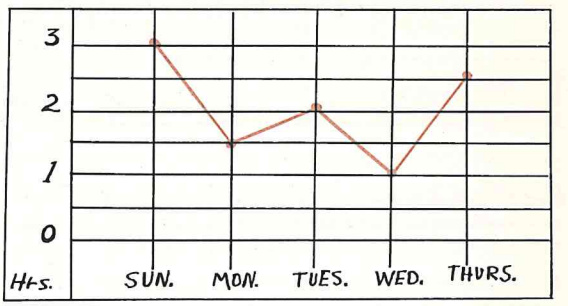
11. How much less than $10.00 is $3.95 + $1.75?



Chapter 16

Making a Line Graph

Bob made a graph to show the number of hours he had watched television each day for five days. This kind of a graph is called a line graph. The numbers at the left show hours. The abbreviations for the names of the days are written at the bottom of the graph.



The dot at the point where the line marked 3 crosses the line marked Sun. shows that Bob watched television for 3 hours on Sunday.

1. How long did Bob watch television on Monday? On Tuesday? Wednesday? Thursday?

2. On which days did he watch television less than $2\frac{1}{2}$ hours?

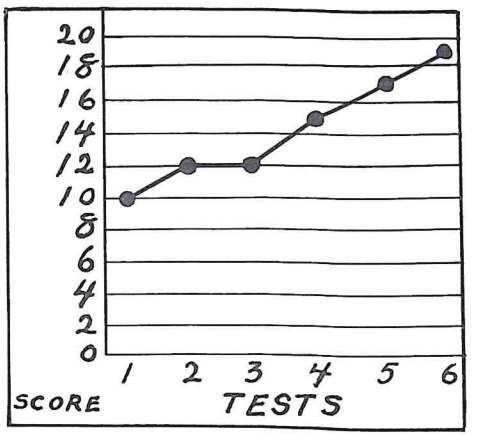
3. How much longer did he watch television on Sunday than on Monday?

4. How many hours did he watch television on all 5 days?

More about Line Graphs

You can use graphs to give many kinds of information. For example, a line graph is a good way to show test scores.

Jack made a line graph to show the number of words he had spelled correctly on spelling tests of 20 words each.



The numbers at the left show the scores. The numbers at the bottom show that there were 6 tests.

1. What is the highest possible score?

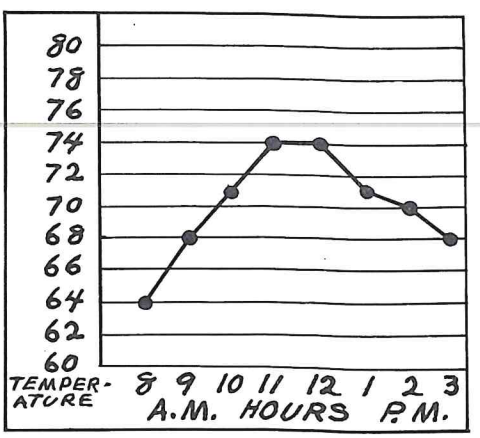
2. How is a score of 15 shown on the graph?

3. What score did Jack make on test 1?

4. How does the graph show that he made a score of 12 on test 2?

5. On which test did he make the lowest score? The highest score?

6. On which tests did he make the same score?



7. Are Jack's scores improving?

The graph at the left shows the indoor temperature in a classroom. Answer the questions below about it.

8. At what hours was the temperature at 68°?

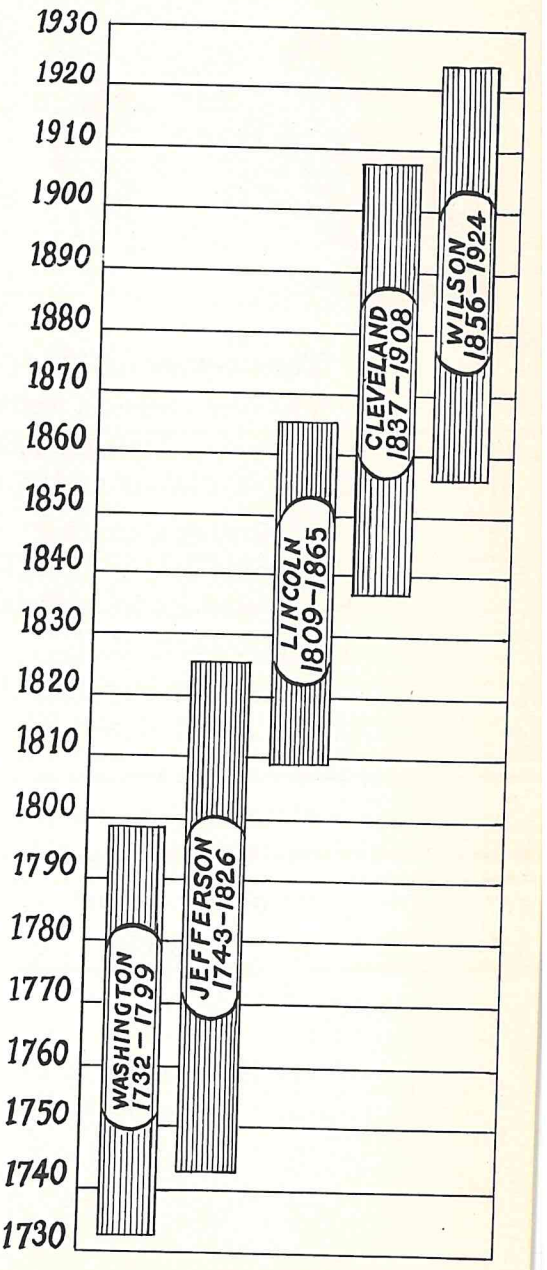
9. What was the highest temperature for the day? What was the lowest temperature?

10. What was the average temperature for the day?

11. Make a graph showing the temperature as registered by the thermometer in your room each hour during the day.

Another Kind of Graph

This bar graph covering 200 years shows when five of our Presidents lived. The numbers at the left show the years. The bottom of each bar tells you the year in which the President was born. The top of each bar tells you when he died.



1. How can you tell from the graph that Washington was born in 1732 and died in 1799?

2. How old was Washington when he died?

3. Which of these famous men lived the longest?

4. How old was Lincoln when he died?

5. Who lived longer, Washington or Lincoln?

6. How old was Washington when Jefferson was born?

7. How many years is it since Wilson died?

8. Which of the men were alive in 1840?

9. About how old was Lincoln when Jefferson died?

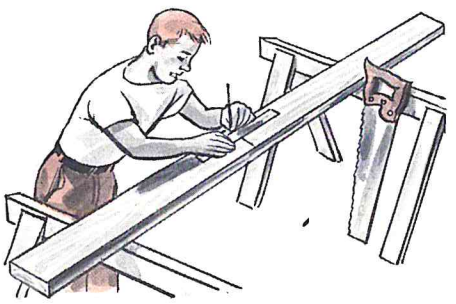
10. How long had Washington been dead when Lincoln was born?

11. How old was Cleveland when Wilson was born?

12. How many years older was Cleveland when he died than Wilson was when he died?

Writing Remainders as Fractions

1. Bob wants to cut a 7-foot board into 2 equal pieces. How long should he make each piece?



He knows that $7 \div 2 = 3$ r1. He could cut 2 pieces each 3 feet long and have 1 foot left. But he doesn't want anything left.

He can think of the 1 foot left as divided into 2 equal parts, each $\frac{1}{2}$ of a foot long. Do you see that he should cut the board into 2 pieces each $3\frac{1}{2}$ feet long?

The example for the above problem looks like this:

$$2\overline{)7}\quad 3\tfrac{1}{2}$$
$$\underline{6}$$
$$1$$

The remainder is written as part of the quotient and not as something left. It is written as a fraction with the divisor as the denominator.

2. Shirley's mother baked 9 dozen cookies for the cookie sale and put them into 4 boxes with the same number of cookies in each box. How many dozen cookies did she put into each box?

When you divide 9 dozen by 4, the answer is 2 dozen and 1 dozen left. You can separate 1 dozen into 4 equal parts.

$$4\overline{)9}\quad 2\tfrac{1}{4}$$
$$\underline{8}$$
$$1$$

What is the answer for the problem question?

Do you see that the remainder is written as a fraction and is part of the quotient?

3. Jane wants to cut a piece of ribbon 25 inches long into 4 equal pieces. How many inches long should she make each piece?

4. Billy had 8 bundles of old newspapers which weighed a total of 33 pounds. What was the average weight per bundle?

5. Copy and divide. Write the answers as mixed numbers.

$2\overline{)5}$ $3\overline{)4}$ $4\overline{)5}$ $3\overline{)10}$ $2\overline{)9}$ $5\overline{)7}$ $2\overline{)17}$ $5\overline{)22}$

Reducing Fractions in Quotients

1. Nancy has a piece of ribbon 36 inches long which she wants to cut into 8 equal pieces. How many inches long should she make each piece?

$$8\overline{)36}\quad 4\tfrac{4}{8} = 4\tfrac{1}{2}$$
$$32$$
$$4$$

Notice that the remainder, 4, is written as a fraction.

When possible, reduce the fraction in a quotient. Why is $4\frac{1}{2}$ inches a more suitable answer than $4\frac{4}{8}$ inches?

2. Nancy's mother can get 10 pounds of sugar at a sale for \$.95. What is the cost per pound?

$$10\overline{)\$.95}\quad \$.09\tfrac{5}{10} = ?$$
$$90$$
$$5$$

The remainder is part of the quotient so it is written as a fraction.

What is the answer to the question in the problem?

Sometimes it is not sensible to change the remainder to a fraction. Find the answer for this problem.

3. Saturday 11 boys came to play basketball. If they formed 2 teams, how many boys would be on each team?

Would you call the 1 you had left a remainder, or would you change it to a fraction? Why?

Solve the problems below. Change the remainder to a fraction when it is sensible to do so.

4. Joe wants to cut a 25-yard fishing line into 2 equal pieces. How long should he make each piece?

5. How many 6¢ candy bars can Doris buy with a quarter?

6. Lucy's mother bought 15 pounds of potatoes for 85¢. What was the cost per pound?

7. How much would $\frac{1}{4}$ of a 15 pound melon weigh?

Now you have learned:

- When the remainder is a part of the quotient, write it in the quotient as a fraction, reduced to lowest terms.

Buying Groceries

Prices at grocery stores are often listed as shown below. The price is given for a number of pounds or packages. When you divide to find the cost per pound or package, your answer is not always an even number of cents. Each fractional part of a cent is counted as a whole cent in order that the grocer will not lose money when he sells smaller amounts.

Coffee - $1.05 a pound
Potatoes - 10 lb. for $.89
Apples - 3 lb. for $.29
Macaroni - 2 pkg. for $.27
Eggs - $.55 a dozen
Butter - $.89 a pound
Flour - 25 lb. for $1.75
Bread - $.19 a loaf

Answer these questions, using the prices above:

1. The price for each pound of apples would be $9\frac{2}{3}$¢. What would the grocer charge for 1 pound?

2. How much would you have to pay for 2 pounds of apples? For 6 pounds of apples?

3. How much would the grocer charge for 1 package of macaroni? For 4 packages?

4. How much should a 5-pound bag of flour cost at the rate of 25 lb. for $1.75?

5. What would be the total cost for each list of groceries?

Nancy's List

1 lb. coffee
2 loaves bread
1 lb. butter
1 pkg. macaroni

Sally's List

5 lb. apples
2 lb. coffee
$\frac{1}{2}$ doz. eggs
2 loaves bread

Dick's List

10 lb. flour
2 lb. butter
1 loaf bread
1 doz. eggs

John's List

5 lb. potatoes
2 doz. eggs
1 lb. coffee
11 lb. butter

Changing Units of Measures

1. The Cox family uses 19 quarts of milk a week. How many gallons does the family use each week?

You know that to change quarts to gallons, you divide the number of quarts by 4. Can you tell why?

What is the answer to the question in the problem?

$$4\tfrac{3}{4} \text{ gallons}$$
$$4\overline{)19} \text{ quarts}$$
$$\underline{16}$$
$$3 \text{ quarts}$$

2. The Smith family uses 6 gallons of milk a week. How many quarts do they use each week?

To change gallons to quarts, multiply 4 quarts by the number of gallons. Why?

What is the answer? 6×4 qt. = ? qt.

$$\begin{array}{r} 4 \\ \times 6 \\ \hline 24 \end{array}$$

3. Jane needs 6 pints of grape juice for punch. How many quarts of grape juice should she buy?

4. Bob swam the length of a 45-yard swimming pool. How many feet did Bob swim?

5. Janet and her mother made a 10-quart kettle full of apple sauce. They planned to put it into pint jars. How many jars did they need?

6. Bob sold 25 bags of potatoes which held 1 peck each. How many bushels of potatoes did he sell?

7. On a long automobile trip Bill's father used 18 quarts of oil. How many gallons equal the 18 quarts?

Copy and write the missing numbers:

8.	1 yd. = ? ft.	1 ft. = ? in.	1 yd. = ? in.
9.	1 min. = ? sec.	1 hr. = ? min.	1 lb. = ? oz.
10.	1 da. = ? hr.	1 gal. = ? pt.	1 qt. = ? pt.
11.	1 gal. = ? qt.	1 wk. = ? da.	1 pk. = ? qt.
12.	1 yr. = ? mo.	1 doz. = ? things	1 qt. = ? cups
13.	18 oz. = ? lb.	49 things = ? doz.	30 da. = ? wk.

At the Food Market

When the price of an article is a mixed number, the clerk charges a whole cent for the fraction of a cent.

1. What is the price per pound for green beans? Would it be possible to pay exactly that much?

2. What is the price per pound of tomatoes? The price per head of lettuce?

3. What would 3 heads of lettuce cost?

4. How much less per pound do apples cost at the price of 5 lb. for 49¢ than at the regular price of 11¢ per lb.?

5. Robert bought 2 dozen oranges, a head of lettuce, and 5 pounds of apples. How much did he pay?

6. Mrs. Moore bought a pound of green beans and a dozen oranges. How much change should she receive from $1.00?

7. Susan bought 2 pounds of apples, 2 pounds of tomatoes, and 2 heads of lettuce. How much did she pay?

Find the answers for these examples. When there is a remainder write it as a fraction in the answer.

8. $6\overline{)25}$ $5\overline{)48}$ $6\overline{)32}$ $7\overline{)51}$ $4\overline{)35}$ $9\overline{)75}$ $4\overline{)29}$ $8\overline{)35}$

9. $2\overline{)17}$ $5\overline{)39}$ $7\overline{)66}$ $3\overline{)20}$ $8\overline{)66}$ $7\overline{)45}$ $2\overline{)15}$ $4\overline{)30}$

10. $5\overline{)44}$ $6\overline{)45}$ $3\overline{)23}$ $8\overline{)60}$ $9\overline{)86}$ $2\overline{)11}$ $9\overline{)47}$ $4\overline{)39}$

Dividing Five-Place Numbers

1. In 20 months Mr. Riley drove his car 18,080 miles. What was the average number of miles per month that Mr. Riley drove his car in that time?

To find the answer you divide 18,080 by 20. This dividend is a five-place number.

$$20\overline{)18080} = 904,\ 180,\ 80,\ 80$$

There are not enough ten-thousands or thousands to divide. *Change* them to 180 hundreds. *Divide* 180 by 20. *Multiply*. *Bring down* the 8 tens. Then *bring down* the 0 in ones' place. *Change* the 8 tens to 80 ones. *Divide* 80 by 20. *Multiply*.

What is the answer? Why is there a zero in tens' place?

Now copy the examples below, divide and check. There will be remainders in the answers in rows 4 and 5.

2. $20\overline{)14040}$ $30\overline{)18090}$ $64\overline{)44864}$ $45\overline{)13590}$ $98\overline{)58898}$

3. $12\overline{)10824}$ $14\overline{)12642}$ $13\overline{)10465}$ $19\overline{)15276}$ $15\overline{)10530}$

4. $30\overline{)27098}$ $70\overline{)28085}$ $55\overline{)38575}$ $73\overline{)65775}$ $82\overline{)49286}$

5. $13\overline{)11740}$ $12\overline{)10865}$ $15\overline{)12089}$ $14\overline{)11250}$ $16\overline{)12853}$

Now study the example at the right.

$$14\overline{)12712} = 908,\ 126,\ 112,\ 112$$

What is the first partial dividend? What is the second partial dividend? Why is the second partial dividend a three-place number?

Divide, and check your work. There will be remainders in some of the answers:

6. $60\overline{)18360}$ $97\overline{)10088}$ $44\overline{)26620}$ $86\overline{)43516}$ $35\overline{)28210}$

7. $12\overline{)10908}$ $14\overline{)12712}$ $14\overline{)11326}$ $16\overline{)12912}$ $18\overline{)14508}$

8. $20\overline{)16150}$ $40\overline{)32385}$ $41\overline{)33049}$ $98\overline{)59198}$ $54\overline{)22100}$

9. $19\overline{)15330}$ $13\overline{)11803}$ $17\overline{)13728}$ $15\overline{)12100}$ $16\overline{)11352}$

More about Dividing Five-Place Numbers

1. Mr. Harris sold 42 head of cattle. The total weight was 42210 pounds. What was the average weight per head?

Find the answer by dividing.

Change ten-thousands to thousands. *Divide* and *multiply*.

Bring down the hundreds, tens, and ones.

Change hundreds and tens to ones. *Divide* and *multiply*.

$$\begin{array}{r} 1005 \\ 42\overline{)42210} \\ \underline{42} \\ 210 \\ \underline{210} \end{array}$$

What is the answer to the problem question?

What are the two partial dividends? How do you find the trial quotient figure for each partial dividend?

Find and check the answers for the examples below. Sometimes the trial quotient figure is not the true one. The examples in rows 4 and 5 have remainders in their answers.

2.	$20\overline{)40180}$	$30\overline{)90120}$	$57\overline{)57171}$	$62\overline{)62310}$	$36\overline{)72108}$
3.	$10\overline{)90020}$	$13\overline{)65117}$	$15\overline{)60135}$	$19\overline{)57114}$	$16\overline{)96112}$
4.	$40\overline{)40162}$	$95\overline{)95382}$	$73\overline{)73370}$	$84\overline{)84800}$	$47\overline{)94213}$
5.	$11\overline{)77035}$	$12\overline{)72100}$	$19\overline{)38131}$	$14\overline{)84139}$	$17\overline{)51130}$

Solve these problems:

6. Mr. Smith is paying for his house. Each year he pays $841.08. What amount should he save each month in order to make the payments at the end of the year?

7. A farmer sold 30 bushels of apples for $91.50. What was the price per bushel?

8. Mr. Wilson used 15 gallons of gasoline in driving his car 270 miles on a trip. How many miles did he get per gallon of gasoline?

9. Mr. Oliver sold a steer for $181.62. He was paid 18¢ a pound. How much did the steer weigh?

Division Review and Practice

Find the answer for each example and problem below. Check your answers.

1. $7\overline{)63}$ $6\overline{)58}$ $3\overline{)92}$ $3\overline{)69}$ $6\overline{)67}$ $3\overline{)84}$ $5\overline{)97}$ $3\overline{)86}$

2. $8\overline{)647}$ $5\overline{)520}$ $4\overline{)819}$ $6\overline{)366}$ $8\overline{)249}$ $9\overline{)477}$ $5\overline{)413}$

3. $7\overline{)4935}$ $4\overline{)1624}$ $8\overline{)6430}$ $9\overline{)4530}$ $4\overline{)9876}$ $5\overline{)7685}$

4. $21\overline{)42}$ $23\overline{)92}$ $32\overline{)192}$ $78\overline{)301}$ $53\overline{)536}$ $18\overline{)846}$

5. $30\overline{)1500}$ $16\overline{)1135}$ $43\overline{)3690}$ $27\overline{)1971}$ $12\overline{)1107}$

6. $90\overline{)1980}$ $18\overline{)1206}$ $70\overline{)1085}$ $14\overline{)1369}$ $58\overline{)2640}$

7. $32\overline{)9600}$ $18\overline{)5400}$ $47\overline{)9415}$ $20\overline{)6080}$ $17\overline{)5170}$

8. $16\overline{)3328}$ $57\overline{)5930}$ $40\overline{)8840}$ $12\overline{)3900}$ $43\overline{)9505}$

9. $70\overline{)7840}$ $42\overline{)8990}$ $64\overline{)7345}$ $18\overline{)8097}$ $16\overline{)5390}$

10. A farmer harvested 4725 bushels of corn from a 45-acre field. What was the average number of bushels per acre?

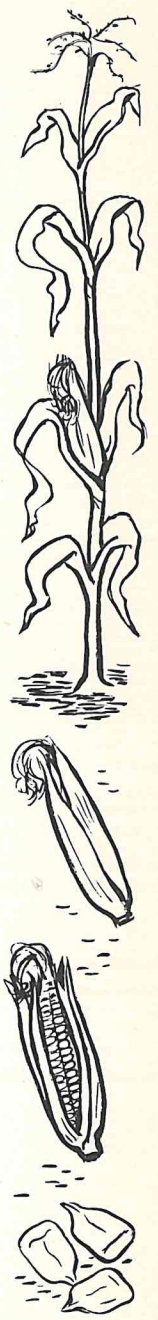
11. Tom worked for 14 weeks during the summer and saved \$47.60. What were his average savings per week?

12. John's father wants to put tile on the floor of a playroom that is 25 feet wide and 30 feet long. How much will the tile cost at \$.15 a square foot?

13. John's father can get cement paint in 50-pound pails that cost \$17.50. What is the cost per pound?

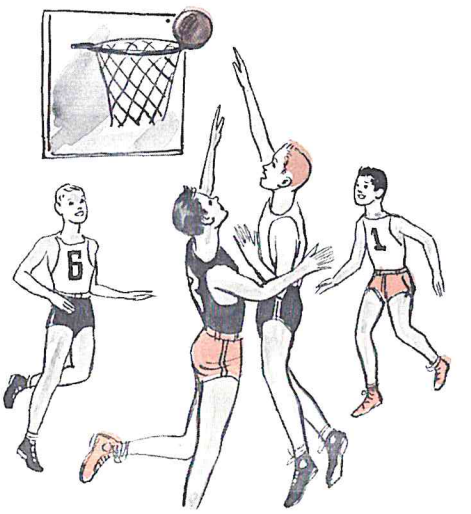
14. Billy's father has driven his new car 5392 miles. If he drives 16 miles on a gallon of gasoline, how many gallons of gas has he used?

15. In the fall Mr. Williams bought 3 loads of coal weighing 3550 pounds, 3750 pounds, and 2700 pounds. In the spring he bought $\frac{1}{2}$ of a ton more. How many pounds of coal did he buy?



Problems to Solve

Read each problem below. Decide how to solve it. Write A, S, M, or D for each step. Then find the answer.



1. It cost 35 high school seniors $281.75 in all to go to the basketball tournament. They agreed to share expenses equally. What was each person's share?

2. Mr. Held's truck loaded with potatoes weighed 5719 pounds. When empty the truck weighed 2275 pounds. How many pounds of potatoes were in the load?

3. Mr. Held sold 5 loads of potatoes. Their average weight was 3672 pounds per load. How many bushels of potatoes did he sell? (A bushel of potatoes weighs 60 lbs.)

4. Tom worked $\frac{1}{2}$ of an hour Monday and $\frac{1}{2}$ of an hour Tuesday. At 50¢ an hour, how much money did he earn?

5. Jack and his father sold 3 bushels of apples at 75¢ a peck. How much money did they get for the apples?

6. Dick's father drove 10,908 miles in 12 months. What was the average number of miles he drove per month?

7. When Betty's father ran for mayor he received 1,912 votes in the first ward, 2,007 votes in the second ward, 1,819 votes in the third ward, and 997 votes in the fourth ward. How many votes in all did he receive in the four wards?

8. The children took in $140.80 for spring festival tickets at 20¢ each. How many tickets had they sold?

9. At a sale Betty can get a $7.98 dress for half price. How much would the dress cost at the sale?

10. At 2 shirts for $5.00, what is the cost of each shirt?

Sensible Answers for Problems

For each problem on this page decide what you think would be a sensible answer. Then solve the problem and compare the answer with your estimate of a sensible one. If there is a big difference, check both your estimate and your work. Try to discover what mistake you made, and correct it.

1. The Jones family uses 22 quarts of milk a week. Mrs. Jones buys her milk in half-gallon bottles at $.42 each. How much does she pay for milk each week?

You know that 22 quarts of milk is a little more than 5 gallons because 4 quarts equal 1 gallon. You know that 5 gallons equal 10 half-gallons. At $.42 a half-gallon, Mrs. Jones would pay $4.20 for 10 half-gallons. Your answer should be a little more than $4.20.

2. Mary has $10 to spend. If she buys shoes for $5.98 and a sweater for $3.49, how much money will she have left?

3. John's father drove his car 13,706 miles in 14 months. On the average, how far had he driven per month?

4. Tom saved $3.98 in September, $1.85 in October, and $2.25 in November. He needs $10 to use for a trip. How much more must he save?

5. A grocer sold 12 dozen eggs at $.69 a dozen. How much money did he get for the eggs?

6. At 23¢ a foot what is the cost of two boards, one $6\frac{1}{2}$ feet long and the other $7\frac{1}{2}$ feet long?

7. John raised 4 bushels of potatoes. He put them into bags holding 1 peck each and sold them at $.79 a peck. How much money did he get for the potatoes?

8. Henry's father wanted to mail some important papers in a sealed envelope. The papers weighed 1 pound and 3 ounces. At $.03 an ounce how much postage must he pay?

9. A farmer sold 40 pigs for $840. What was the average price per pig?

Find the answer for each example and problem below.

Add and check:

1.

392	684	4148	$50.00	$ 42.75	$304.78
476	5260	6295	84.19	328.50	627.50
581	495	4327	28.32	27.94	432.89
452	3270	5109	56.24	596.85	675.93

2.

$4\frac{1}{2}$	$\frac{3}{5}$	$6\frac{1}{3}$	$\frac{1}{2}$	$7\frac{1}{2}$	$3\frac{2}{3}$	$9\frac{1}{2}$	$2\frac{2}{3}$
$\frac{1}{3}$	$7\frac{1}{4}$	$\frac{3}{5}$	$8\frac{1}{5}$	$4\frac{2}{3}$	$6\frac{2}{5}$	$1\frac{7}{10}$	$5\frac{3}{4}$

Subtract and check:

3.

432	6500	$4\frac{1}{8}$	$8\frac{7}{10}$	$4\frac{1}{12}$	$3\frac{3}{5}$	$9\frac{1}{3}$	$7\frac{1}{4}$
125	3271	$1\frac{7}{8}$	$5\frac{1}{2}$	$1\frac{1}{3}$	$1\frac{1}{2}$	$2\frac{1}{2}$	$1\frac{2}{3}$

Multiply and check:

4.

52	84	276	486	384	675	2534	$26.75
84	62	50	75	502	483	47	25

Divide and check:

5. $56\overline{)168}$ $36\overline{)1087}$ $48\overline{)5760}$ $30\overline{)6906}$ $18\overline{)7578}$

Divide and write the remainder as a fraction in the answer:

6. $3\overline{)8}$ $3\overline{)16}$ $8\overline{)18}$ $6\overline{)205}$ $9\overline{)290}$ $4\overline{)5370}$ $12\overline{)4839}$

Find the answers:

7. Dick bought 3 pairs of socks at $.49 a pair and a pair of shoes for $4.98. How much did he spend in all?

8. Bob wants to watch a game televised in California beginning at 2:00 p.m. Pacific Standard Time. Bob lives in Chicago. By Chicago time when will the game begin?

9. At the start of a trip the speedometer on Mr. Meyer's car read 17,095. At the end of the trip it read 17,456. How long was the trip?

10. Find the cost of 65 bushels of corn at $1.40 per bushel.

To Help You Remember

The numbers after the questions or examples are page numbers that tell you where to turn for help if you need it.

▶ *To think and talk about:*

1. Discuss the uses of the various kinds of graphs you have learned about. (208-09, 219-20, 245-47)

2. When you have a two-place divisor, what figure in the divisor do you use in finding the trial quotient figure? (116) When do you use the first figure in the partial dividend and when do you use the first two figures in finding the trial quotient figure? (178, 181)

3. When the first two figures in the dividend form a number smaller than the divisor, how do you divide? (186)

4. When the trial quotient is too large, what do you do to find the true quotient? (116, 120)

5. How do you write a remainder as a fraction in the quotient? (248, 249) When should you do so? (249)

6. How do you estimate the answer for a problem? (89, 93, 257)

7. How do you change large units of measure to smaller units? Small units to larger units? (183, 251)

▶ *To think about and write:*

1. Draw a bar graph showing the temperature at 9:00 a.m. each day for the five school days of one week. (208-09) Then draw a line graph showing the same thing. (245-46) Which do you like better? Why?

2. Divide. Write each remainder as a fraction. (248-49)

$3\overline{)28}$ (42) $6\overline{)80}$ (50) $4\overline{)4899}$ (86) $12\overline{)4298}$ (238) $58\overline{)58348}$ (254)

3. Estimate an answer for this problem; then solve the problem. Was your estimate a sensible answer? (257)

Roger has saved a total of \$7.80 in 12 weeks. What was the average amount saved per week?

Testing Yourself

Find the answer for each example and problem below.

Add:

1.

612	295	7632	$73.90	$ 38.95	$602.46
318	3276	8415	39.26	569.30	339.81
295	6438	2913	46.95	43.21	278.39
763	356	4622	37.60	276.56	455.72

2.

$4\frac{1}{2}$	$\frac{3}{4}$	$5\frac{1}{2}$	$7\frac{3}{4}$	$8\frac{3}{5}$	$2\frac{1}{2}$	$4\frac{5}{8}$	$8\frac{9}{16}$
$\frac{5}{6}$	$2\frac{11}{16}$	$4\frac{2}{5}$	$1\frac{3}{4}$	$8\frac{1}{2}$	$4\frac{4}{5}$	$6\frac{1}{2}$	$3\frac{5}{8}$

Subtract:

3.

658	7040	$4\frac{1}{2}$	$4\frac{3}{4}$	$7\frac{1}{2}$	$9\frac{1}{2}$	$3\frac{2}{3}$	$7\frac{1}{4}$
274	3274	$\frac{1}{6}$	$1\frac{1}{2}$	$3\frac{9}{10}$	$5\frac{3}{4}$	$1\frac{1}{2}$	$3\frac{5}{6}$

Multiply:

4.

43	63	397	592	293	783	3342	$17.93
73	62	30	54	402	394	38	28

Divide:

5. $47\overline{)188}$ $29\overline{)123}$ $56\overline{)7280}$ $40\overline{)1288}$ $21\overline{)7153}$

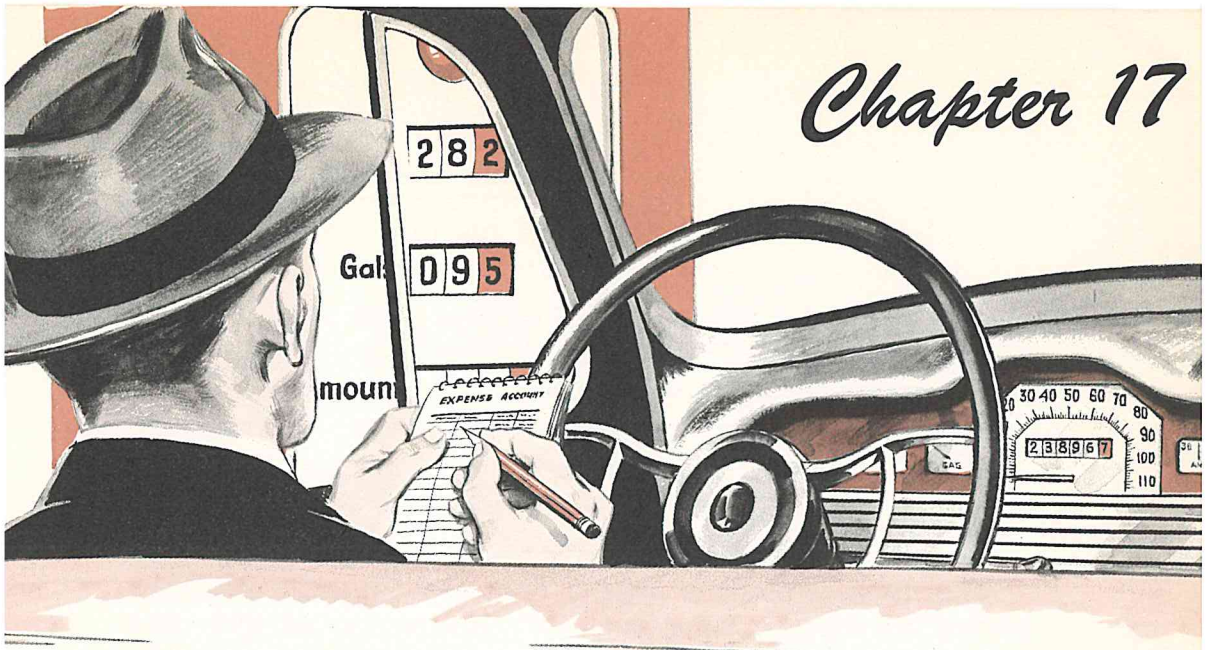
6. $4\overline{)9}$ $2\overline{)17}$ $9\overline{)21}$ $7\overline{)165}$ $8\overline{)204}$ $5\overline{)6156}$ $15\overline{)3070}$

7. The Allens drove 385 miles on Friday, 398 miles on Saturday, and 312 miles on Sunday. What was the average distance driven per day?

8. Judy practiced her piano lesson for $\frac{3}{4}$ of an hour in the morning and for $\frac{1}{2}$ of an hour in the afternoon on Saturday. How much less than 2 hours did she practice?

9. Helen's father was in New York and called his family in Denver by telephone at 6:00 p.m. Eastern Standard Time. What was the time in Denver by Mountain Standard Time?

10. Bill's father drove 1350 miles on a trip. He used 75 gallons of gasoline in his car. What was the average number of miles the car traveled per gallon?



Chapter 17

Learning about Tenths

Both the speedometer in the picture and the gauges on the gasoline pump have a place at the right for a figure that stands for *tenths*. The speedometer shows how many whole miles and how many tenths of a mile the car has traveled. The figures on the gas pump gauge stand for 9 gallons of gas and 5 tenths of a gallon more. These figures are read, *nine and five tenths* gallons, and written, 9.5 gallons.

1. Read the price of gas in cents and tenths of a cent.

2. How many whole miles and how many tenths of a mile has the car traveled?

3. How are the tenths separated from ones on each gauge?

4. When 9 appears in tenths' place on the speedometer, what will be the next figure to appear in tenths' place?

5. When 0 appears in tenths' place, what will happen to the figure in ones' place? How many tenths = 1?

6. What is the largest figure that will appear in tenths' place on the gas pump gauge or the speedometer? Why?

Now you have learned:

- That 10 *tenths* are equal to 1 *one*.

Reading and Writing Tenths

Bob's father keeps a record of his car expenses. Below are numbers like those he wrote in his record book.

Date	Car mileage	Gallons purchased	Price per gallon
3/16	23,896.7	9.5	28.2¢

When a number with tenths in it is written, a *decimal point* (.) is used to separate ones and tenths. The place just to the right of the decimal point is *tenths' place.*

The decimal point is usually read *and.* The car has been driven *twenty-three thousand, eight hundred ninety-six, and seven tenths* miles.

1. How many gallons of gas were bought? What was the price per gallon?

2. Read each of the following numbers. First read the number to the left of the decimal. Then say *and* and tell how many tenths there are in tenths' place.

8.3 19.8 100.6 1,002.8 21,010.5

Sometimes a decimal point is read *point.* The number 6.7 could be read, *six point seven.*

3. Read these numbers in two ways:

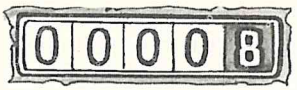
3.0 7.5 17.8 191.7 1,059.6 1,000.4

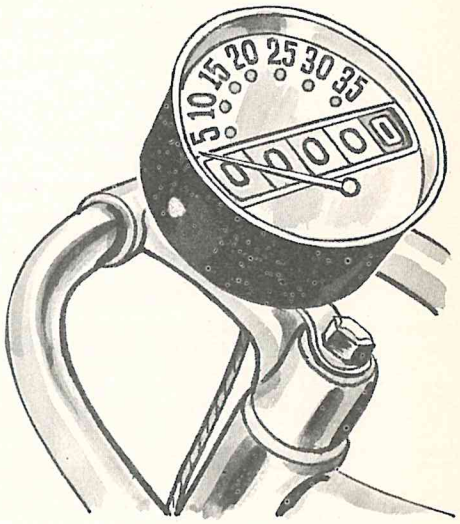
Write each of the following numbers, using a decimal point for *and* or *point.*

4. Eight and four tenths
5. Four thousand and two tenths
6. Eight hundred twenty-five and three tenths
7. Ninety thousand five and one tenth
8. Seventeen thousand five hundred point nine
9. Three hundred twelve thousand point seven

Decimal Fractions and Mixed Decimals

The new speedometer on John's bicycle measures distance to the nearest *tenth* of a mile. When John put it on his bike it looked like the one shown at the right below. After John had ridden his bike to school the speedometer looked like this. ↘





John had ridden *eight tenths* of a mile. Eight tenths is written .8 and is called a *decimal fraction.*

1. Read these decimal fractions:

.6 .5 .9 .1 .7 .4 .2 .3 .8

After John had ridden home from school, the speedometer looked like this. ↘

2. John had ridden *one and six tenths* miles. We use the whole number 1 and the *decimal fraction* .6 to write 1.6. A whole number is an *integer.* 1.6 is a *mixed decimal* because it is made up of an integer and a decimal fraction.

3. Read these mixed decimals:

3.4 5.9 8.7 4.5 9.6 7.3 1.1 2.8 6.2

At school track meets, races are timed to the nearest tenth of a second. This chart shows the high school records in seconds for 4 races.

Race	Record
100 yds.	9.4 sec.
220 yds.	20.7 sec.
440 yds.	48.0 sec.
440 yd. relay	42.0 sec.

4. Read the time for each race.

5. Why is a 0 used in tenths' place in two of the records?

Adding Decimal Fractions

1. Betty read that .5 of an inch of snow fell on Sunday and .4 of an inch fell on Monday. How much snow fell during the two days?

To find the answer, add, as in A. Add tenths in the same way that you add ones, tens, or hundreds. Keep the decimal points in a vertical line. Put a decimal point in the sum directly below the decimal points in the addends.

2. Study example B. The letter O means *ones* and the letters Ts mean *tenths*. You can easily see that 9 tenths + 5 tenths = 14 tenths. Change 10 tenths to 1 one. 4 tenths are left. The sum is 1 and 4 tenths, or 1.4 as shown. Read the sum.

3. Study example C. It shows that when there are no tenths left, you write 0 in the tenths' place. How do you read the sum?

A
$$\begin{array}{r} .5 \\ +.4 \\ \hline .9 \end{array}$$

B
$$\begin{array}{r} \begin{array}{c|c} O & Ts \end{array} \\ .9 \\ +.5 \\ \hline 1.4 \end{array}$$

C
$$\begin{array}{r} \begin{array}{c|c} O & Ts \end{array} \\ .8 \\ +.2 \\ \hline 1.0 \end{array}$$

Find the sums for the examples below. Check your work.

4.

.6	.4	.3	.4	.2	.3	.4	.5	.9	.6
.3	.4	.5	.3	.4	.7	.8	.6	.7	.8

5.

.4	.3	.4	.1	.1	.8	.4	.2	.6	.7
.2	.1	.3	.0	.4	.5	.5	.5	.8	.3
.3	.3	.1	.7	.4	.7	.7	.4	.4	.5

6.

.3	.5	.4	.2	.2	.3	.7	.6	.4	.5
.7	.7	.8	.6	.2	.1	.4	.1	.2	.7
.6	.2	.6	.3	.7	.8	.7	.3	.1	.3
.7	.7	.5	.4	.5	.9	.1	.1	.8	.6

Solve these problems:

7. On Sunday .3 of one inch of rain fell. On Monday another .5 of an inch fell. What was the total rainfall?

8. Betty rode her bicycle .6 of a mile in the morning and .9 of a mile in the afternoon. How many miles was that?

Adding Mixed Decimals

1. A surveyors' tape, like the one shown above, measures feet and tenths of a foot. Using a surveyors' tape Mr. Johnson learned that the strip of land beside his house was 6.3 feet wide. He bought a strip 3.5 feet wide from his neighbor, so he could build a driveway. How wide a strip did he have then?

O	Ts
6	.3
+3	.5
9	.8

Add 6.3 feet and 3.5 feet to find the answer. First add the tenths. Then add the ones. Be sure to keep the decimal points in a vertical line. What is the answer to the problem question?

2. In the example at the right, tenths were added first. 8 tenths + 5 tenths = 13 tenths = 1 one and 3 tenths. 3 was written in tenths' place. Next ones were added, then tens (T). Read the sum.

T	O	Ts
4	6	.8
+5	1	.5
9	8	.3

Find the answers for these addition examples and problems:

3.

2.4	3.5	32.8	87.6	75.4	49.9	147.9	278.4
.4	1.4	1.6	9.5	18.6	88.8	46.5	125.9

4.

2.3	9.5	7.5	2.6	3.5	6.4	7.9	73.5
5.9	9.5	8.9	6.1	9.9	4.7	35.4	26.9
4.7	3.9	6.2	1.3	7.3	8.6	4.5	8.4

5.

27.6	47.6	41.9	89.8	73.9	63.1	75.0
23.0	98.5	87.7	68.8	82.4	45.8	150.0
35.8	37.5	74.3	97.9	36.9	36.9	23.3
18.7	14.8	57.9	23.9	46.5	87.7	949.8

6. Nancy rode her bicycle 4.6 miles on Saturday and 2.7 miles on Sunday. How far did she ride on both days?

7. On a trip, Mr. Lee bought gas as follows: 8.5 gal., 6.9 gal., 13.7 gal., 11.6 gal. How many gallons did he buy?

Subtracting Decimal Fractions and Mixed Decimals

1. Study the three examples, A, B, and C below. Examples A and B show you that you subtract tenths in the same way that you subtract ones.

A	B	C
	O | Ts	T | O | Ts
.9	7 .2	4 5 .8
−.7	−6 .1	−4 3 .9
.2	1 .1	1 .9

● In example C there were not enough tenths in the minuend to subtract. Do you see that 1 one was changed to 10 tenths and added to the 8 tenths? 4 ones were left. 18 tenths − 9 tenths = 9 tenths. 4 ones − 3 ones = 1 one. The answer is 1 and 9 tenths. Read the answer.

Find and check the answers for these subtraction examples:

2.

.9	.5	.7	3.6	5.7	8.8	7.1	6.5	7.7
.6	.4	.1	.2	.4	.5	.9	.7	.8

3.

3.4	6.4	5.6	6.3	4.2	9.2	64.8	95.7
2.1	2.3	4.3	3.5	2.6	6.4	42.9	23.6

4.

61.7	73.7	32.6	83.1	72.4	82.3	20.5	90.0
55.3	56.2	27.4	45.7	36.6	34.7	19.8	69.5

Solve these problems:

5. Bob ran 50 yards in 7.5 seconds. John ran 50 yards in 6.1 seconds. How much longer did it take Bob than John?

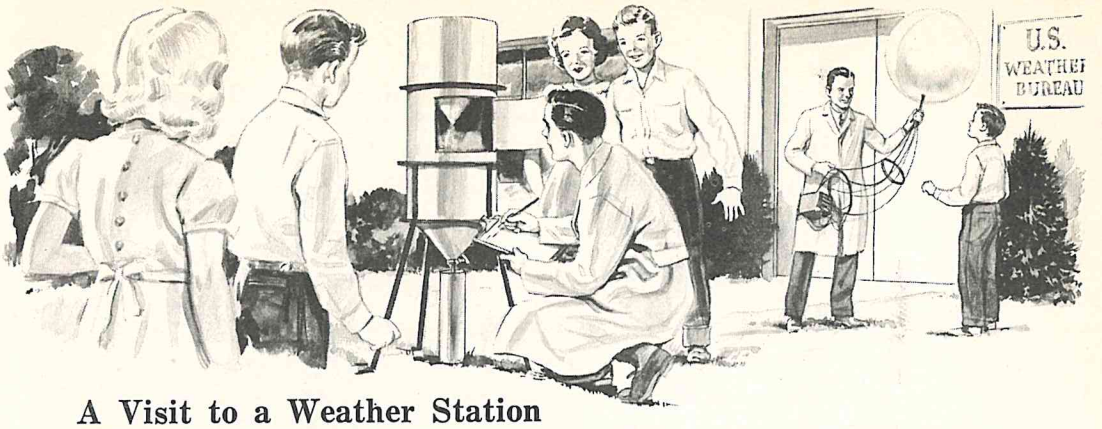
6. Betty's father said that high-test gas cost 31.4¢ per gallon, and regular gas cost 28.6¢ a gallon. How much more did high-test gas cost per gallon than regular gasoline?

7. Find the difference between 55.4 miles and 44.6 miles.

8. Betty estimated that the time between the lightning flash and the thunder was 5.5 seconds. Roy's estimate was 4.8 seconds. What was the difference in their estimates?

Now you have learned:

◑ You add or subtract *tenths* in the same way that you add or subtract *ones*, *tens*, or *hundreds*.



A Visit to a Weather Station

The picture shows the rain gauge at a weather station. It measures rainfall to hundredths of an inch. A *hundredth* is one-tenth as large as a tenth. The gauge shows that 7 hundredths, or .07 of an inch of rain has fallen.

Notice that the figure for hundredths is written in the second place to the right of the decimal point.

1. Read each of these numbers: .01 .09 .06 .05

When there are both tenths and hundredths in a number, such as .29, read the tenths and hundredths together and say, *twenty-nine hundredths.*

The number 3.35 is read, *three and thirty-five hundredths,* or *three point thirty-five.*

2. Read the chart at the right. *Precipitation* means rainfall or snowfall. *Excess* means more than the usual amount.

Precipitation today	.07 in.
Month's excess	.13 in.
Year's excess	2.19 in.

Study the table below. It shows average annual rainfall.

3. How much rain does Alabama usually have each year?

4. What is the average rainfall in Arizona?

5. How much rainfall is there in Colorado each year? In Missouri?

Annual Rainfall

Alabama ...	61.79 in.
Arizona	7.81 in.
Colorado ...	14.01 in.
Missouri	38.23 in.

Adding and Subtracting Hundredths

Since you can add and subtract tenths you will have no trouble with hundredths (Hs). Study the examples below.

A	B	C	D
Ts | Hs	Ts | Hs	Ts | Hs	Ts | Hs
.0 | 5	.0 | 8	.0 | 7	.1 | 7
+.0 | 1	+.1 | 8	−.0 | 5	−.0 | 9
.0 | 6	.2 | 6	.0 | 2	.0 | 8

1. In which example were there no tenths to add? No tenths to subtract?

2. In which subtraction example were tenths changed to hundredths? In which addition example were hundredths changed to tenths? Why was this done?

Find the answers. Watch the signs. Check your work:

3.	.07	.04	.07	.06	.08	.04	.06	.04
	+.01	+.04	+.09	+.09	+.05	+.07	+.06	+.09
4.	.09	.11	.16	.10	.18	.13	.15	.09
	−.06	−.04	−.07	−.07	−.09	−.08	−.07	−.05
5.	.10	.06	.04	.03	.12	.06	.13	.15
	+.02	+.07	+.08	+.16	−.07	−.04	−.09	−.11

6. On Sept. 21 one year the rainfall in Chicago was .03 inches. On Sept. 22 it was .07. How much more moisture fell in Chicago on Sept. 22 than on Sept. 21?

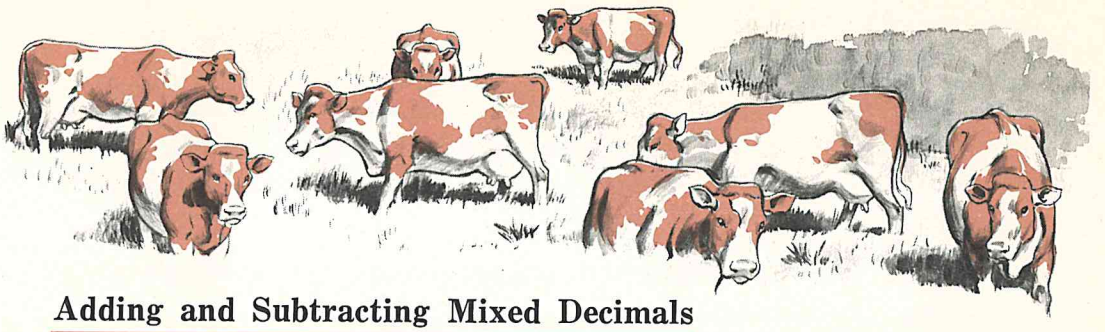
7. How much moisture fell in Chicago on the two days?

8. On Sept 21 the rainfall in Detroit was .15 inches. On Sept. 22 it was .07 inches. How much more moisture fell in Detroit on Sept. 21 than on Sept. 22?

9. How much greater was the rainfall in Detroit than in Chicago on Sept. 21?

Now you have learned:

- You add or subtract *hundredths* in the same way that you add or subtract *tenths*.



Adding and Subtracting Mixed Decimals

1. One of Mr. Blackburn's cows produced 61.04 pounds of butter fat in Jan., 56.27 pounds in Feb., and 55.88 pounds in March. How many pounds of butter fat did the cow produce in the 3 months?

Write the example and add, like this:

	Hundreds	Tens	Ones		Tenths	Hundredths
		6	1	.	0	4
		5	6	.	2	7
+		5	5	.	8	8
	1	7	3	.	1	9

Add hundredths. Change 10 hundredths to 1 tenth. Add tenths. Change 10 tenths to 1 one. Add ones. Change 10 ones to 1 ten. Add tens. Change 10 tens to 1 hundred.

Notice the sum. Ones' place is in the center, left of the decimal point. Tens' place is next left. Tenths' place is next right. Hundreds are next left of tens and hundredths are next right of tenths. Study the chart above.

2. Study the example at the right. To find the answer you must change 1 one to 10 tenths and 1 tenth to 10 hundredths before you can subtract. Then you must change 1 ten to 10 ones before you can subtract ones. Be sure you understand how the answer was found.

$$\begin{array}{r} 61.04 \\ -39.35 \\ \hline 21.69 \end{array}$$

Add and check:

3.

.35	2.38	3.86	5.05	43.90	1.11	85.27
+.24	+15.19	+9.57	+8.27	63.09	41.57	8.16
				+53.09	+53.09	+20.05

Subtract and check:

4.

.27	.87	.15	89.75	4.02	80.01	121.04
−.03	−.49	−.07	−14.57	−3.75	−19.98	− 98.98

Using Decimal Fractions in Problems

Read each problem below. Decide what it tells, what it asks, and what you must do to find the answer. Then answer the question the problem asks.

1. Mr. Jones found that one strip of metal that he measured was .98 inches thick, and another strip was .75 inches thick. How much thicker was the first strip than the second?

2. When Jane was sick, her temperature was 100.9° at noon and 102.3° at 6:00 p.m. How much higher was her temperature at 6 p.m. than it was at noon?

3. When Mr. Elder got his new car the speedometer read 9.8 miles. At the end of the month the speedometer read 1120.5. How far had the car been driven since Mr. Elder got it?

4. One morning the speedometer on Mr. Jerome's car read 3236.4 miles. That evening it read 3305.2 miles. How far had the car been driven that day?

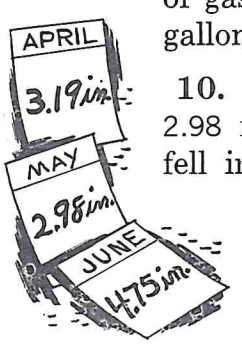
5. In an automobile economy run, the winning car averaged 26.05 miles per gallon of gasoline. The second place car averaged 25.97 miles per gallon. How many more miles per gallon did the winner average than the second place car?

6. In April Jane's father bought 196.5 gallons of gasoline, in May 85.9 gallons, in June 79.6 gallons and in July 99.7 gallons. How much did he buy in the four months?

7. Mr. Horton looked at two suits. One was priced at $54.75, the other at $49.85. What was the difference in price?

8. John bought a shirt for $3.65 and his father bought a jacket for $12.97. How much did they spend?

9. One month Mr. Lee's car averaged 17.7 miles per gallon of gasoline. The next month the average was 20.3 miles per gallon. How much did the average increase?



10. In April, Chicago had 3.19 inches of rain. In May, 2.98 inches fell, and 4.75 inches in June. How much rain fell in Chicago during those three months?

To Help You Remember

The page numbers after the questions or instructions tell you where to turn for help if you need it.

▶ *To think and talk about:*

1. How many tens, ones, tenths, and hundredths are there in the number 42.19? (269)

2. In what two ways could you read the number 31.3? (262)

3. What kind of fraction is each of these? $\frac{1}{2}$ (134) .5 (263)

4. Which is the integer and which is the fraction in 1.6? What kind of number is 1.6? (263)

5. How many times larger are ones than tenths? How many times larger are tens than ones? (261, 263)

6. Where should you write the first quotient figure for the example at the right? How many places will there be in the quotient? (253-54)

$42\overline{)84210}$

7. If you know that the divisor is 9 and the dividend is 72, what is the quotient? (38)

8. If the minuend is 108 and the subtrahend is 98, what is the difference? (17)

9. If the sum of two numbers is 49 and one of the addends is 20, what is the other addend? (17)

10. The product of two numbers is 63. The multiplicand is 7. What is the multiplier? (33, 38)

▶ *To think about and write:*

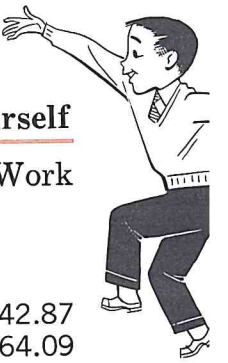
1. In the number 896.73 there are ____hundreds, ____tens, ____ones, ____tenths, and ____hundredths. (269)

2. Find the sum of \$19.05, \$2.39, \$141.17. (75)

3. What is the difference between 179 and 208? (17, 22)

4. What is the product of 6 and 298? (33, 36)

5. Find the quotient when the divisor is 17 and the dividend is 886. (38, 177-79)



Testing Yourself

Find the answer for each example and problem below. Work quickly, but be sure your answers are correct.

Add:

1.

3894	\$82.97	.6	.8	6.8	1.3	27.3	42.87
6742	35.00	.2	.9	.4	5.1	4.8	64.09
5305	40.85	.1	.5	3.5	6.0	17.9	2.35

2.

$2\frac{1}{5}$	$4\frac{3}{8}$	$2\frac{2}{5}$	$2\frac{5}{8}$	$6\frac{1}{4}$	$3\frac{1}{2}$	$5\frac{7}{8}$	$4\frac{1}{2}$	$7\frac{3}{4}$
$\frac{3}{5}$	$1\frac{1}{8}$	$6\frac{4}{5}$	$4\frac{7}{8}$	$5\frac{3}{8}$	$4\frac{1}{2}$	$2\frac{1}{2}$	$3\frac{9}{10}$	$8\frac{4}{5}$

Subtract:

3.

320	495	500	\$35.00	.8	3.5	6.4	4.25
25	167	375	14.75	.4	2.1	2.5	2.57

4.

$3\frac{3}{5}$	$6\frac{7}{8}$	$4\frac{2}{3}$	$7\frac{5}{6}$	$6\frac{5}{6}$	$8\frac{1}{2}$	$7\frac{1}{4}$	$8\frac{5}{12}$	$4\frac{1}{6}$
$\frac{2}{5}$	$2\frac{5}{8}$	$2\frac{1}{9}$	$4\frac{1}{2}$	$2\frac{1}{12}$	$1\frac{5}{8}$	$4\frac{5}{6}$	$6\frac{1}{4}$	$2\frac{11}{12}$

Multiply:

5.

38	320	857	594	684	3925	\$28.70
46	47	60	205	700	75	36

Divide:

6. $37\overline{)151}$ $53\overline{)564}$ $86\overline{)2587}$ $36\overline{)7236}$ $27\overline{)5460}$ $52\overline{)52312}$

7. $23\overline{)7015}$ $35\overline{)7147}$ $56\overline{)16856}$ $78\overline{)3198}$ $48\overline{)2495}$

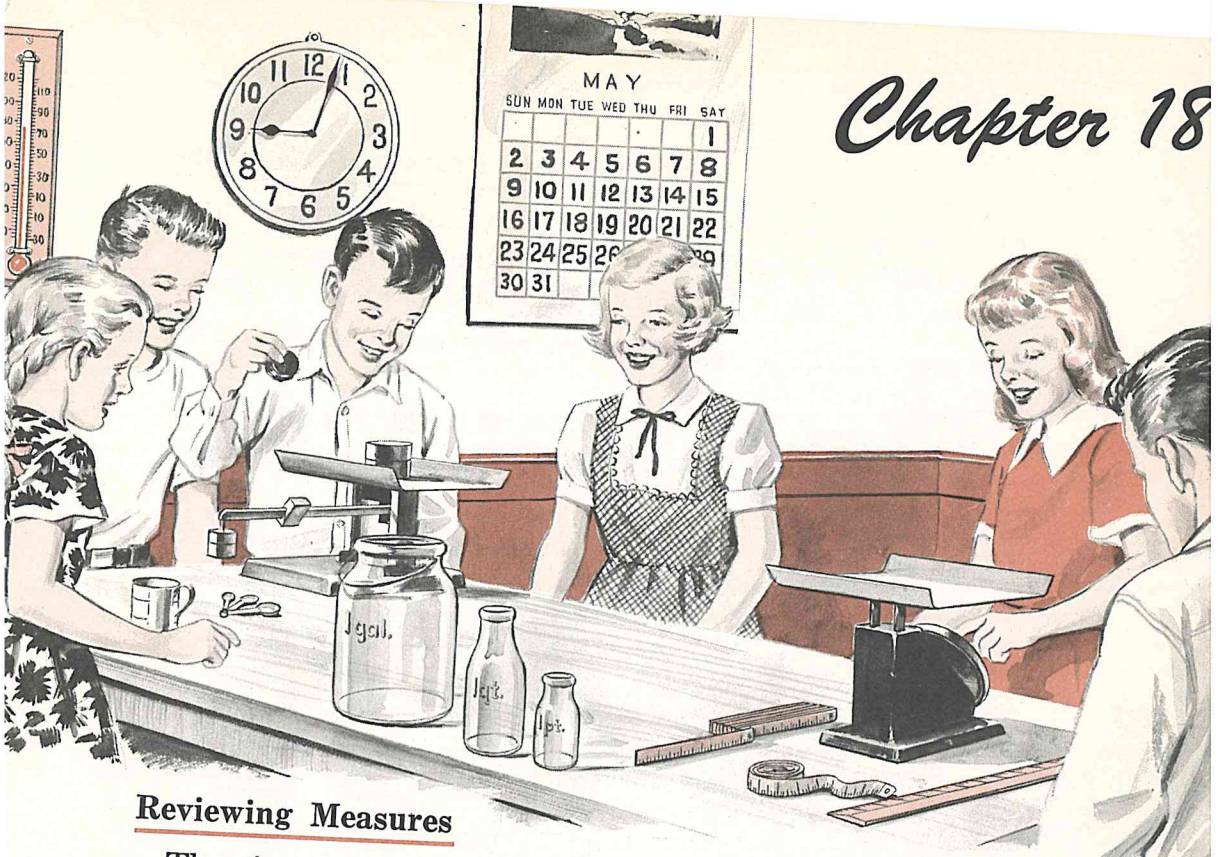
Solve these problems:

8. Ronald's father had a cement walk laid in front of the house. The walk was 5 feet wide and 50 feet long. At \$.45 a square foot what did the walk cost?

9. A wholesale grocer bought a 3155-pound truck load of potatoes. He put them into bags holding 15 pounds each. How many bags did he fill and how many pounds were left?

10. On a warm day the temperature rose from 71.5° at 6:00 a.m. to 90.7° at 3:00 p.m. How many degrees did it rise?

Chapter 18



Reviewing Measures

The picture above shows several types of measuring instruments which are in common use.

1. Name each instrument and describe the units that are used in measuring with it.

2. What measuring instruments have you used? Tell how you used them.

3. How do you change small units of measure to larger units?

4. How do you change large units of measure to smaller units?

5. Change each of the following pairs of measures to the smaller unit: 1 yd. 2 ft. 2 wk. 4 da. 4 gal. 1 qt. 3 lb. 6 oz. 2 hr. 15 min.

6. Change each of the following to the next larger unit: 28 da. 15 ft. 20 pt. 80 oz. 16 qt. 72 min.

Review and Practice in Addition

Find the answers for the addition examples and problems on this page. You should check each answer in order to be sure that it is right. Add down first; then add up to check.

The page numbers after the rows tell you where to turn for help if you need it.

1.

5	9	57	72	96	24	72	27	$.96	
4	6	2	9	4	33	53	38	.84	(8, 9, 11)

2.

2	5	5	5	90	21	13	30	$.70	
2	1	2	1	3	30	70	19	.89	
1	3	2	2	4	15	65	18	.42	
4	2	20	26	3	23	81	17	.65	(10, 11)

3.

13	21	76	18	320	64	$ .36
21	31	80	29	42	75	.47
30	503	91	17	63	89	.86
505	52	762	309	78	976	8.79 (13)

4.

273	516	310	140	180	101	$4.11
920	809	400	192	271	212	2.03
221	426	321	107	100	103	8.70
308	809	842	269	265	209	4.51
120	414	525	103	202	321	6.02 (13)

5.

606	3171	209	3630	5202	6276	$33.01
4322	109	872	790	117	12124	75.19
803	6362	4590	4864	2208	4137	84.00
211	181	2762	1757	9309	5245	43.18
623	123	1803	2609	6123	28120	32.55 (68, 155)

6. Four persons took a trip by automobile. Their weights were 181 lb., 165 lb., 204 lb., and 179 lb. What was the total weight of the four passengers?

7. Mr. Dunn bought a coat for $45.75, a hat for $10.00, and a shirt for $3.45. How much did he pay altogether?

8. There are three schools in Shorewood. In one school there are 278 children, in another 246 children, and in the third 425 children. How many children is that in all?

Review and Practice in Subtraction

Find the answer for each subtraction example and problem on this page. You should always check each answer in arithmetic to be sure that it is right. To check, add the subtrahend and the difference. This will give you the same number as the minuend if your answer is right.

The page numbers at the ends of the rows tell you where to turn for help if you need it.

1.

8	9	16	89	73	75	50	46	$.56	
3	4	7	7	7	44	30	37	.29	(18, 20, 21)

2.

7	6	15	68	47	89	92	82	$.95	
4	3	8	4	9	48	80	76	.88	(18, 20, 21)

3.

345	345	320	762	563	804	$8.04	
32	62	76	170	245	678	2.56	(22)

4.

3346	8403	2376	5678	6045	6507	$70.01	
539	276	387	2289	1473	2869	38.49	(70-71)

5.

64835	72918	80021	36972	54019	$413.29	
4652	5369	63514	21786	37344	283.91	(155)

6. Betsy has practiced her piano lesson 15 minutes. She must practice 40 minutes. How much longer must she practice?

7. The regular price of a suit was $24.50. It was on sale for $19.98. How much had the price been reduced?

8. During the summer Tom worked and saved $24.75. After buying a jacket for $11.98, how much money did he have left?

9. Ruth had $1.75. She bought a scarf for $.87. How much more does she need to buy a blouse that costs $1.98?

10. There are 511 children in the Jefferson School. One day 34 were absent. How many were present?

11. A truck loaded with coal weighed 6926 lbs. When it was empty the truck weighed 3580 lbs. How many pounds of coal were in the truck?

Review and Practice in Multiplication

Find the answer for each of the multiplication examples and problems on this page. Check each answer to prove that it is correct. You know that you can check multiplication by multiplying again very carefully.

The page numbers at the ends of the rows tell you where to turn for help if you need it.

1.

3	9	43	74	19	28	39	47	$.69	
2	4	2	2	5	3	2	8	5	(34, 35)

2.

421	300	372	921	169	926	$9.89	
2	5	2	5	9	3	9	(36)

3.

2134	1903	7601	7605	5079	2435	$65.89	
2	3	9	7	6	4	9	(81, 82)

4.

10	20	28	73	92	86	21	82	$.29	(90-92)
29	48	36	93	23	72	84	64	10	(99, 100)

5.

426	723	295	832	692	436	295	$8.14	
32	42	65	73	39	87	76	47	(162)

6.

2931	7438	2432	6291	3846	$92.17	
26	32	76	43	68	73	(170)

7.

382	246	493	725	683	639	$4.83	
213	435	619	361	286	365	622	(171)

8. Mr. Waters saves $12.50 each pay day. If he has 24 pay days a year, how much does he save in a year?

9. The Board of Education bought 84 copies of the language textbook at $1.75 each. What was the total cost?

10. John's father pays $75.50 a month rent for his house. How much rent will he pay for the house in 6 months?

11. How far would a jet plane fly in 12 hours if its average speed was 550 miles per hour?

12. At $3.25 per hour how much will I earn in 40 hours?

Review and Practice in Division

Find the answer for each example and problem below. Check each answer by multiplying the quotient by the divisor. The product you get should be the same number as the dividend.

The page numbers at the ends of the rows tell you where to turn for help if you need it.

1. $4\overline{)8}$ $5\overline{)8}$ $8\overline{)56}$ $8\overline{)75}$ $3\overline{)69}$ $4\overline{)86}$ $7\overline{)85}$ (39, 42, 50)

2. $2\overline{)100}$ $9\overline{)819}$ $7\overline{)358}$ $8\overline{)656}$ $7\overline{)371}$ $6\overline{)265}$ (52)

3. $2\overline{)201}$ $3\overline{)694}$ $4\overline{)896}$ $4\overline{)875}$ $6\overline{)960}$ $6\overline{)786}$ (55, 57, 59)

4. $3\overline{)4935}$ $9\overline{)8148}$ $9\overline{)2735}$ $8\overline{)6430}$ $4\overline{)4610}$ (86)

5. $11\overline{)44}$ $11\overline{)36}$ $12\overline{)96}$ $12\overline{)85}$ $13\overline{)65}$ $14\overline{)56}$ (114-16, 118)

6. $43\overline{)215}$ $27\overline{)139}$ $27\overline{)819}$ $24\overline{)985}$ $32\overline{)769}$ (120-21, 178-79)

7. $38\overline{)1907}$ $42\overline{)2127}$ $39\overline{)1638}$ $48\overline{)2495}$ $19\overline{)1273}$ (186-88)

8. $27\overline{)5426}$ $27\overline{)5427}$ $46\overline{)9259}$ $82\overline{)8364}$ $45\overline{)9367}$ (221-23)

9. $18\overline{)5760}$ $15\overline{)4507}$ $12\overline{)7565}$ $15\overline{)4879}$ $36\overline{)7779}$ (237-39)

10. $35\overline{)70105}$ $45\overline{)90225}$ $29\overline{)11629}$ $86\overline{)25886}$ (253-54)

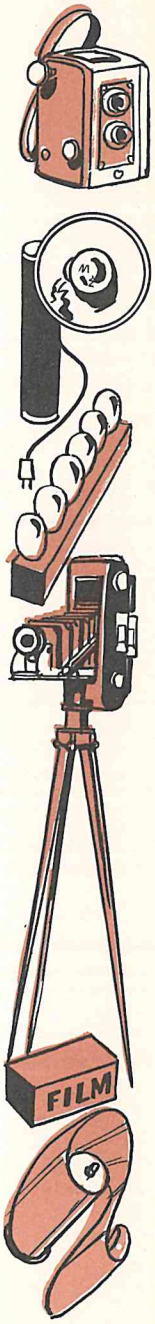
In row 11 write the remainders as fractions in the answers.

11. $4\overline{)9}$ $6\overline{)14}$ $3\overline{)20}$ $7\overline{)30}$ $6\overline{)38}$ $8\overline{)76}$ $6\overline{)50}$ (248)

12. Betty's mother paid \$4.80 for a case of 24 cans of fruit. What was the cost of each can?

13. A farmer plans to put 845 pounds of potatoes into bags which will each hold 60 lb. How many bags can he fill and how many pounds of potatoes will be left?

14. The Treasurer of the Camera Club had collected \$1.80 in dues. The dues are \$.15 per person. How many members had paid their dues?



Reviewing Addition of Fractions

You have learned how to find a fractional part of a number and how to add fractions. You have also learned how to change fractions to lower terms and to higher terms. You know that the answer to a problem or an example should always be in lowest terms.

Follow the instructions below. The page numbers at the ends of the rows tell you where to turn if you need help.

1. Change these improper fractions to mixed numbers or whole numbers.

$\frac{10}{8}$ $\frac{12}{3}$ $\frac{9}{4}$ $\frac{6}{5}$ $\frac{10}{5}$ $\frac{14}{8}$ $\frac{7}{3}$ $\frac{15}{5}$ $\frac{16}{12}$ $\frac{8}{2}$ (135)

2. Reduce to lowest terms any of the fractions in this row that are not already in lowest terms.

$\frac{9}{12}$ $\frac{7}{8}$ $\frac{5}{6}$ $\frac{2}{4}$ $\frac{3}{8}$ $\frac{7}{14}$ $\frac{3}{6}$ $\frac{8}{9}$ $\frac{6}{10}$ $\frac{8}{12}$ (107, 131)

Add. Be sure each answer is in lowest terms.

3.

$\frac{1}{7}$	$\frac{2}{9}$	$\frac{2}{15}$	$\frac{3}{16}$	$\frac{2}{5}$	$\frac{5}{7}$	$\frac{4}{5}$	$\frac{5}{8}$	$\frac{7}{10}$	$\frac{2}{3}$
$\frac{2}{7}$	$\frac{5}{9}$	$\frac{4}{15}$	$\frac{5}{16}$	$\frac{3}{5}$	$\frac{2}{7}$	$\frac{2}{5}$	$\frac{7}{8}$	$\frac{7}{10}$	$\frac{1}{3}$

(129-32, 135)

4.

$15\frac{1}{4}$	$\frac{2}{3}$	$4\frac{2}{5}$	$3\frac{1}{3}$	$5\frac{3}{8}$	$3\frac{3}{10}$	$7\frac{4}{7}$	$4\frac{7}{16}$
$\frac{3}{4}$	$9\frac{1}{3}$	$2\frac{1}{5}$	$6\frac{1}{3}$	$6\frac{1}{8}$	$4\frac{1}{10}$	$4\frac{5}{7}$	$8\frac{13}{16}$

(137-39)

5.

$\frac{3}{8}$	$\frac{5}{12}$	$8\frac{7}{9}$	$4\frac{2}{9}$	$2\frac{2}{5}$	$4\frac{1}{3}$	$2\frac{1}{4}$	$2\frac{2}{3}$
$\frac{7}{8}$	$\frac{11}{12}$	$9\frac{5}{9}$	$\frac{1}{3}$	$6\frac{3}{10}$	$3\frac{2}{3}$	$9\frac{1}{2}$	$3\frac{1}{6}$
$\frac{3}{4}$	$\frac{1}{6}$	$\frac{2}{3}$	$4\frac{2}{3}$	$\frac{1}{2}$	$3\frac{5}{9}$	$1\frac{3}{8}$	$5\frac{1}{2}$

(202, 206)

6.

$\frac{1}{8}$	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{2}{3}$	$\frac{3}{4}$	$\frac{9}{10}$	$\frac{5}{12}$
$\frac{1}{4}$	$\frac{5}{9}$	$\frac{3}{8}$	$\frac{1}{12}$	$\frac{1}{6}$	$\frac{5}{8}$	$\frac{4}{9}$	$\frac{7}{12}$	$\frac{3}{5}$	$\frac{5}{6}$

(199-201)

7.

$5\frac{3}{8}$	$4\frac{2}{3}$	$4\frac{1}{6}$	$8\frac{1}{2}$	$6\frac{3}{4}$	$7\frac{5}{6}$	$4\frac{7}{12}$	$8\frac{7}{10}$
$\frac{1}{4}$	$\frac{1}{9}$	$\frac{1}{2}$	$\frac{1}{10}$	$\frac{5}{8}$	$\frac{1}{3}$	$\frac{3}{4}$	$\frac{4}{5}$

(204)

8.

$3\frac{1}{9}$	$6\frac{1}{4}$	$7\frac{1}{6}$	$9\frac{1}{2}$	$3\frac{2}{3}$	$9\frac{3}{5}$	$7\frac{3}{4}$	$2\frac{5}{6}$
$2\frac{1}{3}$	$7\frac{1}{8}$	$4\frac{7}{12}$	$6\frac{1}{4}$	$7\frac{4}{9}$	$2\frac{7}{10}$	$5\frac{7}{12}$	$8\frac{2}{3}$

(205)

9. $\frac{1}{4} + \frac{1}{4} = ?$ $\frac{1}{2} + \frac{1}{4} = ?$ $\frac{3}{8} + \frac{3}{8} = ?$ $\frac{7}{8} + \frac{5}{8} = ?$ $\frac{7}{10} + \frac{9}{10} = ?$

Reviewing Subtraction of Fractions

You have learned how to subtract like fractions, unlike fractions, and mixed numbers. Use what you have learned. Copy the examples in each row below and subtract. Then work the problems. Be sure your answers are in lowest terms.

The page numbers at the ends of the rows tell you where to turn for help if you need it.

1. $\frac{4}{5}$ $\frac{7}{9}$ $\frac{5}{8}$ $6\frac{5}{7}$ $5\frac{5}{6}$ $9\frac{7}{8}$ $4\frac{5}{12}$ $6\frac{6}{7}$
$\frac{2}{5}$ $\frac{1}{9}$ $\frac{1}{8}$ $\frac{3}{7}$ $\frac{1}{6}$ $\frac{3}{8}$ $\frac{1}{12}$ $2\frac{4}{7}$ (145-48)

2. $9\frac{9}{10}$ $4\frac{5}{8}$ $7\frac{7}{10}$ 1 1 $1\frac{1}{10}$ $1\frac{5}{8}$ $4\frac{1}{5}$
$5\frac{1}{10}$ $1\frac{1}{8}$ $5\frac{3}{10}$ $\frac{2}{3}$ $\frac{7}{8}$ $\frac{9}{10}$ $\frac{7}{8}$ $\frac{4}{5}$ (147-50)

3. $6\frac{1}{7}$ $9\frac{5}{12}$ $7\frac{1}{10}$ $5\frac{2}{7}$ $7\frac{2}{9}$ $6\frac{4}{9}$ $7\frac{3}{8}$ $4\frac{2}{3}$
$\frac{4}{7}$ $\frac{11}{12}$ $\frac{3}{10}$ $2\frac{3}{7}$ $4\frac{4}{9}$ $2\frac{7}{9}$ $5\frac{5}{8}$ $3\frac{2}{3}$ (150-52)

4. $\frac{2}{3}$ $\frac{7}{8}$ $\frac{5}{6}$ $\frac{6}{12}$ $4\frac{2}{5}$ $7\frac{5}{6}$ $4\frac{2}{3}$ $8\frac{7}{12}$ $5\frac{5}{12}$
$\frac{5}{9}$ $\frac{1}{4}$ $\frac{1}{3}$ $\frac{1}{4}$ $\frac{3}{10}$ $\frac{3}{12}$ $\frac{1}{6}$ $\frac{1}{3}$ $\frac{1}{6}$ (213-14)

5. $9\frac{7}{8}$ $7\frac{9}{10}$ $6\frac{3}{5}$ $2\frac{8}{9}$ $1\frac{1}{2}$ $1\frac{1}{6}$ $1\frac{1}{2}$ $1\frac{1}{16}$
$2\frac{1}{4}$ $6\frac{2}{5}$ $6\frac{1}{10}$ $1\frac{1}{3}$ $\frac{7}{8}$ $\frac{1}{3}$ $\frac{5}{6}$ $\frac{7}{8}$ (215-16)

6. $1\frac{2}{15}$ $8\frac{1}{9}$ $4\frac{1}{8}$ $9\frac{5}{12}$ $5\frac{1}{3}$ $6\frac{2}{3}$ $7\frac{1}{8}$ $8\frac{2}{5}$
$\frac{4}{5}$ $\frac{1}{3}$ $\frac{3}{16}$ $\frac{3}{4}$ $\frac{5}{6}$ $3\frac{5}{6}$ $4\frac{3}{4}$ $4\frac{1}{10}$ (216-18)

7. $6\frac{3}{4}$ $8\frac{4}{15}$ $1\frac{1}{2}$ $6\frac{1}{4}$ $7\frac{1}{2}$ $8\frac{1}{4}$ $6\frac{9}{10}$ $5\frac{1}{6}$ (216-18)
$2\frac{1}{12}$ $6\frac{3}{5}$ $\frac{5}{6}$ $\frac{2}{3}$ $3\frac{2}{7}$ $7\frac{1}{3}$ $4\frac{5}{6}$ $1\frac{3}{4}$ (233-35)

8. $\frac{3}{5} - \frac{2}{5} = ?$ $\frac{7}{8} - \frac{5}{8} = ?$ $\frac{3}{4} - \frac{1}{4} = ?$ $\frac{7}{10} - \frac{3}{10} = ?$ (145-46)

9. Dick had a board $5\frac{1}{6}$ feet long. He sawed off a piece that was $3\frac{1}{3}$ feet long. How much of the board was left?

10. Jerry has a garden in his back yard that is $4\frac{1}{3}$ yards wide and $6\frac{1}{4}$ yards long. What is the difference between the length and the width?

11. Mark is $56\frac{1}{2}$ inches tall and Bill is $54\frac{3}{4}$ inches tall. How much taller is Mark than Bill?

Reviewing Decimal Fractions

Answer the questions and find the answers for the examples on this page. The numbers at the ends of the lines tell you where to turn for help if you need it.

1. What do each of the fives mean in 555.55?

Hundreds	Tens	Ones	.	Tenths	Hundredths
5	5	5	.	5	5

5 hundredths	= 5 ×	.01	=	.05
5 tenths	= 5 ×	.1	=	.50
5 ones	= 5 ×	1	=	5.00
5 tens	= 5 ×	10	=	50.00
5 hundreds	= 5 ×	100	=	500.00
				555.55

2. Write these whole numbers, decimal fractions, and mixed decimals, using figures:

four tenths — four tens — four hundreds

four hundredths — two and five tenths — two ones

thirty-two and eight hundredths

one hundred twenty-seven and thirty-two hundredths

Add:

3.

.2	.1	.3	3.6	2.8	2.5	7.0	6.3	
.3	.3	.3	1.5	3.6	1.2	8.2	6.2	
.4	.2	.5	2.3	8.7	4.1	4.9	5.5	(264-65)

4.

8.1	7.1	27.6	80.0	24.6	26.75	2.06	
7.2	2.3	85.9	7.2	13.5	183.02	10.70	
5.3	8.0	42.6	16.4	27.8	24.80	9.05	
6.0	9.8	75.0	5.9	19.4	78.25	19.32	(265, 268-69)

Subtract:

5.

.7	.9	.4	.6	7.5	8.6	5.6	2.8
.3	.6	.2	.4	4.7	2.9	.8	.9 (266)

6.

18.6	75.1	7.2	25.06	16.07	75.26	
7.8	63.4	5.3	13.75	8.09	18.07	(266, 268-69)

Your Plan for Solving Problems

You know how to solve one-step problems and also how to solve problems requiring more than one step. You know that it is easy to solve problems if you will do these things:

> Decide what the problem tells you and what question it asks. (12, 19, 37, 40, 41)

> Decide whether one step, or more than one step, is required to find the answer to the problem question. (73)

> Decide for each step whether you should add, subtract, multiply, or divide. (122, 225)

> Write the example for each step and find the answer. Check your work. (10, 21, 35, 49)

> Decide whether or not the answer you get for the problem is a sensible answer. (89, 93, 257)

Follow your plan and solve these problems:

1. Jane bought a yard of tape. She used 24 inches to sew around a pot holder. How many inches of tape were left?

2. What is the perimeter of a flower bed that is 25 feet long and 12 feet wide?

3. How many glasses of milk can be served from 1 quart and 1 pint if each glass holds $\frac{1}{2}$ of a pint?

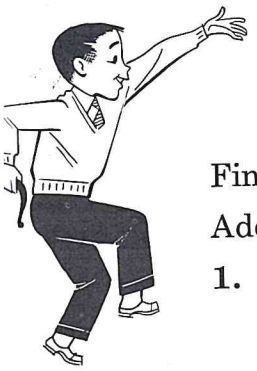
4. How much a gallon cheaper is milk in $\frac{1}{2}$-gallon jugs at \$.39 each than in quarts at \$.21 each?

5. When Mr. Milton started on a 1275-mile trip, his speedometer read 3,899.8. What will it probably read when he completes the trip?

6. Betty's mother paid a milk bill of \$11.78 for the month of March. What was the average daily cost of the milk?

7. A grocer bought 55 dozen eggs at \$.58 a dozen, and sold them at \$.75 a dozen. How much did he make on the eggs?

8. Mr. Baker has a garden 25 feet wide and 38 feet long. How much will it cost to fence the garden at 45¢ a foot?



Testing Yourself in Addition and Multiplication

Find the answer for each example and problem on this page.

Add:

1.

2	5	27	96	86	75	$ .29	$ .56
3	2	19	45	79	86	.48	.80
1	3	18	57	50	272	3.84	.97
4	20	34	34	942	45	.75	8.00

2.

180	440	102	606	339	$27.62	$27.65
251	891	206	719	550	16.51	16.09
170	700	315	806	872	31.61	35.79
293	755	127	717	9400	21.22	14.58
	983	238	300			

3.

$\frac{2}{5}$	$\frac{1}{4}$	$1\frac{3}{5}$	$2\frac{3}{8}$	$8\frac{1}{2}$	$4\frac{5}{12}$	$1\frac{5}{6}$	$3\frac{5}{8}$	$4\frac{1}{3}$	$6\frac{3}{5}$
$\frac{2}{5}$	$4\frac{1}{4}$	$6\frac{3}{5}$	$2\frac{7}{8}$	$5\frac{3}{8}$	$6\frac{1}{3}$	$3\frac{1}{3}$	$7\frac{1}{2}$	$9\frac{1}{2}$	$8\frac{1}{2}$

4. $54.6 + 375.2 + 50.67 + .38 = ?$ $325.6 + 3.27 + 504.5 = ?$

Multiply:

5.

27	150	601	8720	1402	9407	$98.95
3	5	9	4	7	8	6

6.

13	22	20	47	62	70	72	$.84	$.15
61	36	94	71	29	59	47	84	61

7.

168	325	716	438	2659	7351	$65.96
26	21	34	59	62	76	93

8.

343	215	648	537	296	836	289	$5.03
217	321	286	497	353	643	554	376

9. Jane bought 3 dozen oranges at $.35 a dozen, a head of cabbage for $.26, and 3 pounds of steak for $2.40. How much did she spend?

10. The principal ordered health books for the 26 children in the fifth-grade class. They cost $1.84 each. What was the cost of the books for the whole class?

Testing Yourself in Subtraction and Division

Find the answer for each example and problem on this page.

Subtract:

1.

7	8	18	67	48	88	56	$.67	$.32
4	3	9	5	9	9	9	.32	.29

2.

762	245	710	302	327	555	988	$4.03
80	28	89	45	109	279	499	3.15

3.

6758	5678	3605	6004	6780	6785	$50.78
836	399	687	2631	2356	1296	38.49

4.

7683	9249	36538	59638	$632.17	$500.80
2319	6278	4639	8837	376.58	203.85

5.

$\frac{2}{5}$	$4\frac{5}{9}$	$6\frac{1}{3}$	$5\frac{2}{3}$	$7\frac{1}{2}$	$5\frac{1}{2}$	$9\frac{1}{2}$	$5\frac{1}{3}$
$\frac{1}{5}$	$\frac{2}{9}$	$3\frac{1}{6}$	$1\frac{1}{6}$	$2\frac{7}{8}$	$1\frac{3}{4}$	$7\frac{1}{5}$	$3\frac{1}{2}$

Divide:

6. $2\overline{)102}$ $8\overline{)729}$ $8\overline{)440}$ $8\overline{)809}$ $7\overline{)372}$ $7\overline{)707}$ $6\overline{)603}$

7. $3\overline{)302}$ $3\overline{)987}$ $7\overline{)845}$ $7\overline{)847}$ $5\overline{)597}$ $6\overline{)788}$ $5\overline{)770}$

8. $12\overline{)48}$ $45\overline{)49}$ $36\overline{)144}$ $42\overline{)844}$ $26\overline{)546}$ $36\overline{)757}$

9. $56\overline{)1137}$ $36\overline{)1470}$ $59\overline{)1416}$ $26\overline{)5276}$ $35\overline{)7147}$

10. $42\overline{)84210}$ $52\overline{)52318}$ $34\overline{)17068}$ $73\overline{)36579}$

For row 11, write the remainders as fractions in the answers.

11. $3\overline{)7}$ $8\overline{)18}$ $5\overline{)27}$ $8\overline{)43}$ $6\overline{)38}$ $4\overline{)39}$ $9\overline{)84}$ $7\overline{)40}$

12. An airplane flew 3600 miles in 16 hours. What was its average speed per hour?

13. At the start of a vacation Mr. Hilton's car speedometer registered 39624 miles. When he returned home it registered 42383 miles. How far had he driven?

Testing Yourself in Solving Problems

Find the answer for each problem on this page.

1. Tom is $55\frac{3}{4}$ inches tall, and Dick is $53\frac{1}{2}$ inches tall. Tom is how much taller than Dick?

2. At a special sale Bob's father bought $\frac{1}{2}$ of a dozen pairs of socks for \$3.00. The regular price was \$.69 a pair. How much did he save by taking $\frac{1}{2}$ of a dozen pairs at the sale price rather than buying at the regular price?

3. John's father has a truck rated at 5 tons capacity. The scales showed that he had 11,968 pounds of gravel in the truck. How much was the truck overloaded?

4. Mr. Johnson rents an apartment for \$85 a month. How much rent does he pay in a year?

5. A truck load of shelled corn weighs 7000 pounds. There are 56 pounds in a bushel of corn. How much is the corn worth at \$1.30 a bushel?

6. John wants to buy a bicycle for \$39.75. He has \$19.98 in savings and he got \$5 for his birthday. How much more money does he need?

7. Mary's mother bought a 5-pound roast at \$.89 a pound, a dozen oranges for \$.69, and a bag of flour for \$3.44. What was the total cost?

8. The price of a new car is \$2198. The salesman will give Judy's father \$950 for his old car. How much money will Judy's father have to pay if he trades his old car for the new car?

9. Jane's mother asked her to buy 3 cans of orange juice and a pound of hamburger. If orange juice is \$.37 a can, and hamburger is \$.63 a pound, how much must she pay?

10. Ray's mother bought $7\frac{1}{2}$ pounds of ground beef and $4\frac{3}{4}$ pounds of ground pork to make a meat loaf for a picnic. How many pounds of meat did she use?

11. One Saturday Jerry caught four fish. They weighed 2 lb., 1 lb., $1\frac{1}{4}$ lb., and $1\frac{3}{4}$ lb. What was their average weight?

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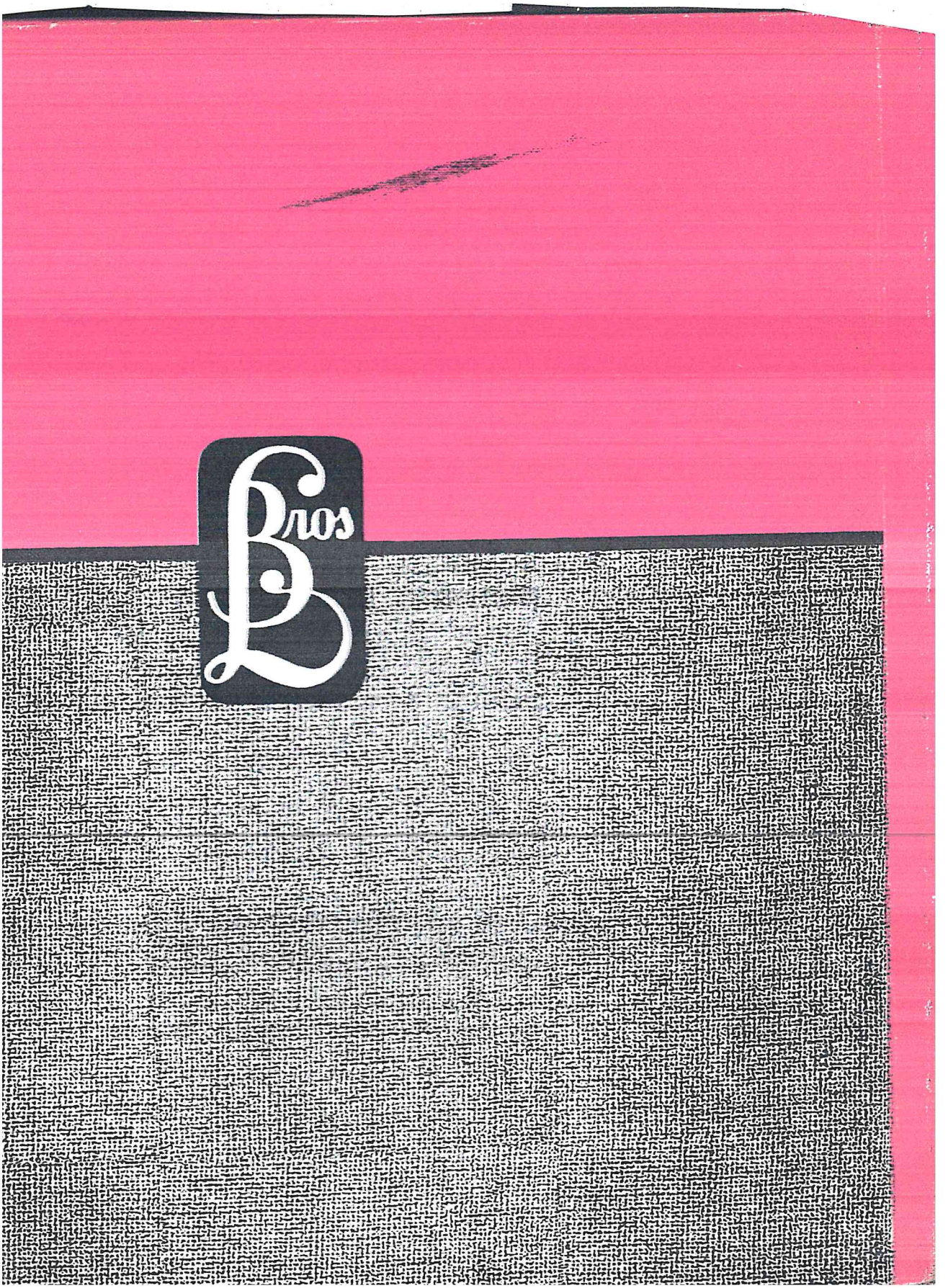
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